



United States Department of Agriculture,
Natural Resources Conservation Service and Forest Service

In cooperation with the
Michigan Agricultural Experiment Station

Supplement to Soil Survey of Delta County and Hiawatha National Forest of Alger and Schoolcraft Counties, Michigan

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Introduction

This publication supplements the soil survey of Delta County and Hiawatha National Forest of Alger and Schoolcraft Counties published in 1977 (3). This supplement was prepared by the Natural Resources Conservation Service in 1994 to provide updated soil interpretations. It is part of the technical assistance furnished to the Soil and Water Conservation Districts of Delta, Alger, and Schoolcraft Counties.

Fieldwork for the original soil survey was completed in 1967. The survey continues to be helpful in adjusting land uses, including urbanization, to the limitations and potentials of natural resources and the environment. It also continues to be helpful in avoiding soil-related failures in land uses.

Since the original soil survey was completed, changes have been made to some soil names and taxonomic classifications. These changes do not affect interpretations. The renamed soils are mainly those that were variants. For example, the Au Gres series, gravelly subsoil variant, has been renamed the Battlefield series. The soils that have been renamed are listed under the heading "Renamed Soil Map Units." A complete list of the current soil names and map symbols is given in table 1.

Because of changes in soil taxonomy, the classification of many soils has been changed. The changes in classification are shown under the heading "Reclassified Soil Series." A complete list of the current taxonomic classifications is given in table 16.

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Renamed Soil Map Units

Symbol	Name in 1977	Name in 1994
AvA	Au Gres loamy sand, gravelly subsoil variant, 0 to 4 percent slopes	Battlefield loamy sand, 0 to 4 percent slopes
EaB	East Lake sand, 0 to 6 percent slopes	Springlake sand, 0 to 6 percent slopes
EcB	East Lake loamy sand, acid variant, 0 to 6 percent slopes	Adams loamy sand, 0 to 6 percent slopes
EcD	East Lake loamy sand, acid variant, 6 to 18 percent slopes	Adams loamy sand, 6 to 18 percent slopes
Nh	Nahma loam	Nahma muck
PfA	Pickford silt loam, moderately wet, 0 to 4 percent slopes	Algonquin silt loam, 0 to 4 percent slopes
PkA	Pickford complex, 0 to 4 percent slopes	Algonquin-Pickford complex, 0 to 4 percent slopes
ScA	Saugatuck sand, 0 to 3 percent slopes	Finch sand, 0 to 3 percent slopes

Reclassified Soil Series

Soil Series*	Classification in 1977	Classification in 1994
Angelica	Fine-loamy, mixed, nonacid frigid Aeric Haplaquepts	Fine-loamy, mixed, nonacid frigid Aeric Endoaquepts
Au Gres Variant (Battlefield)	Sandy, mixed, frigid Entic Haplaquods	Sandy, mixed, frigid Typic Endoaquods
Bowers	Fine, mixed Aquic Eutroboralfs	Fine, mixed Glossaqueic Eutroboralfs
Brevort	Sandy over loamy, mixed, nonacid, frigid Mollic Haplaquents	Sandy over loamy, mixed, nonacid, frigid Mollic Endoaquents
Brimley	Fine-loamy, mixed, frigid Alfic Haplaquods	Fine-loamy, mixed, frigid Argic Endoaquods
Bruce Variant	Coarse-loamy, mixed, nonacid, frigid Aeric Haplaquepts	Coarse-loamy, mixed, nonacid, frigid Aeric Endoaquepts
Burt	Loamy, mixed, nonacid, frigid Lithic Haplaquepts	Siliceous, frigid Lithic Psammaquents
Charlevoix	Coarse-loamy, mixed, frigid Alfic Haplaquods	Coarse-loamy, mixed, frigid Argic Endoaquods
Croswell	Sandy, mixed, frigid Entic Haplorthods	Sandy, mixed, frigid Oxyaqueic Haplorthods
Deford	Mixed, frigid Mollic Psammaquents	Mixed, frigid Typic Psammaquents
Duel	Sandy, mixed, frigid Entic Haplorthods	Sandy, mixed, frigid Typic Haplorthods

East Lake (Springlake)	Sandy, mixed, frigid Typic Haplorthods	Sandy, mixed, frigid Typic Haplorthods
East Lake Variant (Adams)	Sandy, mixed, frigid Typic Haplorthods	Sandy, mixed, frigid Typic Haplorthods
Emmet	Coarse-loamy, mixed, frigid Alfic Haplorthods	Coarse-loamy, mixed Typic Eutroboralfs
Ensign	Loamy, mixed, frigid Lithic Haplaquods	Loamy, mixed, frigid Lithic Eutrochrepts
Ensley	Coarse-loamy, mixed, nonacid, frigid Aeric Haplaquepts	Coarse-loamy, mixed, nonacid, frigid Aeric Endoaquepts
Gilchrist	Sandy, mixed, frigid Typic Haplorthods	Sandy, mixed, frigid Oxyaqua Haplorthods
Iosco	Sandy over loamy, mixed, frigid Aqualfic Haplaquods	Sandy over loamy, mixed, frigid Typic Endoaquods
Karlin	Coarse-loamy, mixed, frigid Typic Haplorthods	Sandy, mixed, frigid Entic Haplorthods
Kawbawgam	Coarse-loamy, mixed, frigid Entic Haplaquods	Coarse-loamy, mixed, frigid Typic Endoaquods
Kawkawlin	Fine, mixed Aquic Eutroboralfs	Fine, mixed Glossaqua Eutroboralfs
Kinross	Sandy, mixed, frigid Typic Haplaquods	Sandy, mixed, frigid Typic Endoaquods
Kiva	Sandy, mixed, frigid Typic Haplorthods	Sandy, mixed, frigid Entic Haplorthods
Munising	Coarse-loamy, mixed, frigid Alfic Fragiorhods	Coarse-loamy, mixed, frigid Oxyaqua Fragiorhods
Nester	Fine, mixed Typic Eutroboralfs	Fine, mixed Glossic Eutroboralfs
Onaway	Fine-loamy, mixed, frigid Alfic Haplorthods	Fine-loamy, mixed Typic Eutroboralfs
Otisco	Sandy, mixed, frigid Entic Haplaquods	Sandy, mixed, frigid Argic Endoaquods
Pickford, moderately wet (Algonquin)	Fine, mixed Aquic Eutroboralfs	Fine, mixed, nonacid, frigid Aeric Epiaquepts
Ruse	Loamy, mixed, nonacid, frigid Lithic Haplaquepts	Loamy, mixed, nonacid, frigid Lithic Endoaquepts
Saugatuck (Finch)	Sandy, mixed, mesic, ortstein Aeric Haplaquods	Sandy, mixed, frigid, ortstein Typic Duraquods
Summerville	Loamy, mixed, frigid Entic Lithic Haplorthods	Loamy, mixed, frigid Lithic Eutrochrepts
Sundell	Coarse-loamy, mixed, frigid Entic Haplaquods	Coarse-loamy, mixed Aquic Haploborolls
Sundell Variant	Sandy, mixed, frigid Entic Haplaquods	Sandy, mixed, frigid Typic Endoaquods
Trenary	Coarse-loamy, mixed, frigid Alfic Fragiorhods	Coarse-loamy, mixed, frigid Alfic Haplorthods
Wainola	Sandy, mixed, frigid Entic Haplaquods	Sandy, mixed, frigid Typic Endoaquods
Wallace	Sandy, mixed, frigid, ortstein Typic Haplorthods	Sandy, mixed, frigid, ortstein Typic Durorthods

* The new correlated names appear in parentheses.

Use and Management of the Soils

This publication is an inventory and evaluation of the soils in the survey area. It can be used to adjust land uses to the limitations and potentials of natural resources and the environment. Also, it can help to prevent soil-related failures in land uses.

In preparing a soil survey, soil scientists, conservationists, engineers, and others collect extensive field data about the nature and behavioral characteristics of the soils. They collect data on erosion, droughtiness, flooding, and other factors that affect various soil uses and management. Field experience and collected data on soil properties and performance are used as a basis in predicting soil behavior.

Information in this section can be used to plan the use and management of soils for crops and pasture; as woodland; as sites for buildings, sanitary facilities, highways and other transportation systems, and parks and other recreational facilities; and for wildlife habitat. It can be used to identify the potentials and limitations of each soil for specific land uses and to help prevent construction failures caused by unfavorable soil properties.

Planners and others using soil survey information can evaluate the effect of specific land uses on productivity and on the environment in all or part of the survey area. The survey can help planners to maintain or create a land use pattern in harmony with the natural soil.

Contractors can use this publication to locate sources of sand and gravel, roadfill, and topsoil. They can use it to identify areas where bedrock, wetness, or very firm soil layers can cause difficulty in excavation.

Health officials, highway officials, engineers, and others may also find this publication useful. The publication can help them plan the safe disposal of wastes and locate sites for pavements, sidewalks, campgrounds, playgrounds, lawns, and trees and shrubs.

Foresters can use information in this publication to estimate forest productivity and to determine management concerns related to operating equipment, harvesting, and planting.

Crops and Pasture

In this section, the estimated yields of the main crops and pasture plants are identified, the system of land capability classification used by the Natural Resources Conservation Service is explained, and prime farmland is described.

Planners of management systems for individual fields or farms should consider the detailed information given in the description of each soil under the heading "Descriptions of the Soils" in the original survey. Specific information can be obtained from the local office of the Natural Resources Conservation Service or the Cooperative Extension Service.

Yields per Acre

The average yields per acre that can be expected of the principal crops under a high level of management are shown in table 2. In any given year, yields may be higher or lower than those indicated in the table because of variations in rainfall and other climatic factors. The land capability classification of each map unit also is shown in the table.

The yields are based mainly on the experience and records of farmers, conservationists, and extension agents. Available yield data from nearby counties and results of field trials and demonstrations are also considered.

The management needed to obtain the indicated yields of the various crops depends on the kind of soil and the crop. Management can include drainage, erosion control, and protection from flooding; the proper planting and seeding rates; suitable high-yielding crop varieties; appropriate and timely tillage; control of weeds, plant diseases, and harmful insects; favorable soil reaction and optimum levels of nitrogen, phosphorus, potassium, and trace elements for each crop; effective use of crop residue, barnyard manure, and green manure crops; and harvesting that ensures the smallest possible loss.

The estimated yields reflect the productive capacity of each soil for each of the principal crops. Yields are

likely to increase as new production technology is developed. The productivity of a given soil compared with that of other soils, however, is not likely to change.

Crops other than those shown in table 2 are grown in the survey area, but estimated yields are not listed because the acreage of such crops is small. The local office of the Natural Resources Conservation Service or of the Cooperative Extension Service can provide information about the management and productivity of the soils for those crops.

Land Capability Classification

Land capability classification shows, in a general way, the suitability of soils for most kinds of field crops. Crops that require special management are excluded. The soils are grouped according to their limitations for field crops, the risk of damage if they are used for crops, and the way they respond to management. The criteria used in grouping the soils do not include major and generally expensive landforming that would change slope, depth, or other characteristics of the soils, nor do they include possible but unlikely major reclamation projects. Capability classification is not a substitute for interpretations designed to show suitability and limitations of groups of soils for woodland and for engineering purposes.

In the capability system, soils are generally grouped at three levels—capability class, subclass, and unit. Only class and subclass are used in the survey (5).

Capability classes, the broadest groups, are designated by numerals I through VIII. The numerals indicate progressively greater limitations and narrower choices for practical use. The classes are defined as follows:

Class I soils have few limitations that restrict their use.

Class II soils have moderate limitations that reduce the choice of plants or that require moderate conservation practices.

Class III soils have severe limitations that reduce the choice of plants or that require special conservation practices, or both.

Class IV soils have very severe limitations that reduce the choice of plants or that require very careful management, or both.

Class V soils are not likely to erode but have other limitations, impractical to remove, that limit their use.

Class VI soils have severe limitations that make them generally unsuitable for cultivation.

Class VII soils have very severe limitations that make them unsuitable for cultivation.

Class VIII soils and miscellaneous areas have limitations that nearly preclude their use for commercial crop production.

Capability subclasses are soil groups within one class. They are designated by adding a small letter, *e*, *w*, *s*, or *c*, to the class numeral, for example, IIe. The letter *e* shows that the main hazard is the risk of erosion unless close-growing plant cover is maintained; *w* shows that water in or on the soil interferes with plant growth or cultivation (in some soils the wetness can be partly corrected by artificial drainage); *s* shows that the soil is limited mainly because it is shallow, droughty, or stony; and *c*, used in only some parts of the United States, shows that the chief limitation is climate that is very cold or very dry.

In class I there are no subclasses because the soils of this class have few limitations. Class V contains only the subclasses indicated by *w*, *s*, or *c* because the soils in class V are subject to little or no erosion. They have other limitations that restrict their use to pasture, woodland, wildlife habitat, or recreation.

Prime Farmland

Prime farmland is one of several kinds of important farmland defined by the U.S. Department of Agriculture. It is of major importance in meeting the Nation's short- and long-range needs for food and fiber. Because the supply of high-quality farmland is limited, the U.S. Department of Agriculture recognizes that responsible levels of government, as well as individuals, should encourage and facilitate the wise use of our Nation's prime farmland.

Prime farmland, as defined by the U.S. Department of Agriculture, is land that has the best combination of physical and chemical characteristics for producing food, feed, forage, fiber, and oilseed crops and is available for these uses. It could be cultivated land, pastureland, forest land, or other land, but it is not urban or built-up land or water areas. The soil qualities, growing season, and moisture supply are those needed for the soil to economically produce sustained high yields of crops when proper management, including water management, and acceptable farming methods are applied. In general, prime farmland has an adequate and dependable supply of moisture from precipitation or irrigation, a favorable temperature and growing season, acceptable acidity or alkalinity, an acceptable salt and sodium content, and few or no rocks. It is permeable to water and air. It is not excessively erodible or saturated with water for long periods, and it either is not frequently flooded during the growing season or is protected from flooding. The slope ranges mainly from 0 to 6 percent. More detailed information about the criteria for prime farmland is available at the local office of the Natural Resources Conservation Service.

About 184,000 acres, or nearly 16 percent of the

survey area, meets the requirements for prime farmland. Scattered areas of this land are throughout the survey area, but most are in associations 5, 6, 9, and 10. The location of each association is shown on the general soil map at the back of the original survey.

A recent trend in land use in some parts of the survey area has been the loss of some prime farmland to industrial and urban uses. The loss of prime farmland to other uses puts pressure on marginal lands, which generally are more erodible, droughty, and less productive and cannot be easily cultivated.

The map units in the survey area that are considered prime farmland are listed in table 3. This list does not constitute a recommendation for a particular land use. On some soils included in the list, measures that overcome a hazard or limitation, such as flooding, wetness, and droughtiness, are needed. Onsite evaluation is needed to determine whether or not the hazard or limitation has been overcome by corrective measures. The extent of each listed map unit is shown in table 1. The location is shown on the detailed soil maps at the back of the original survey. The soil qualities that affect use and management are described under the heading "Descriptions of the Soils" in the original survey.

Woodland Management and Productivity

Table 4 can be used by woodland owners or forest managers in planning the use of soils for wood crops. Only those soils suitable for wood crops are listed. The table lists the ordination symbol for each soil. Soils assigned the same ordination symbol require the same general management and have about the same potential productivity.

The first part of the *ordination symbol*, a number, indicates the potential productivity of the soils for an indicator tree species. The number indicates the volume, in cubic meters per hectare per year, which the indicator species can produce in a pure stand under natural conditions. The number 1 indicates low potential productivity; 2 or 3, moderate; 4 or 5, moderately high; 6 to 8, high; 9 to 11, very high; and 12 to 39, extremely high. The second part of the symbol, a letter, indicates the major kind of soil limitation. The letter *R* indicates steep slopes; *X*, stoniness or rockiness; *W*, excess water in or on the soil; *T*, toxic substances in the soil; *D*, restricted rooting depth; *C*, clay in the upper part of the soil; *S*, sandy texture; *F*, a high content of rock fragments in the soil; *L*, low strength; and *N*, snowpack. The letter *A* indicates that limitations or restrictions are insignificant. If a soil has more than one limitation, the priority is as follows: *R*, *X*, *W*, *T*, *D*, *C*, *S*, *F*, *L*, and *N*.

In table 4, *slight*, *moderate*, and *severe* indicate the

degree of the major soil limitations to be considered in management.

Erosion hazard is the probability that damage will occur as a result of site preparation and cutting where the soil is exposed along roads, skid trails, and fire lanes and in log-handling areas. Forests that have been burned or overgrazed are also subject to erosion. Ratings of the erosion hazard are based on the percent of the slope. A rating of *slight* indicates that no particular prevention measures are needed under ordinary conditions. A rating of *moderate* indicates that erosion-control measures are needed in certain silvicultural activities. A rating of *severe* indicates that special precautions are needed to control erosion in most silvicultural activities.

Equipment limitation reflects the characteristics and conditions of the soil that restrict use of the equipment generally needed in woodland management or harvesting. The chief characteristics and conditions considered in the ratings are slope, stones on the surface, rock outcrops, soil wetness, and texture of the surface layer. A rating of *slight* indicates that under normal conditions the kind of equipment and season of use are not significantly restricted by soil factors. Soil wetness can restrict equipment use, but the wet period does not exceed 1 month. A rating of *moderate* indicates that equipment use is moderately restricted because of one or more soil factors. If the soil is wet, the wetness restricts equipment use for a period of 1 to 3 months. A rating of *severe* indicates that equipment use is severely restricted either as to the kind of equipment that can be used or the season of use. If the soil is wet, the wetness restricts equipment use for more than 3 months.

Seedling mortality refers to the death of naturally occurring or planted tree seedlings, as influenced by the kinds of soil, soil wetness, or topographic conditions. The factors used in rating the soils for seedling mortality are texture of the surface layer, depth to a seasonal high water table and the length of the period when the water table is high, rock fragments in the surface layer, effective rooting depth, and slope aspect. A rating of *slight* indicates that seedling mortality is not likely to be a problem under normal conditions. Expected mortality is less than 25 percent. A rating of *moderate* indicates that some problems from seedling mortality can be expected. Extra precautions are advisable. Expected mortality is 25 to 50 percent. A rating of *severe* indicates that seedling mortality is a serious problem. Extra precautions are important. Replanting may be necessary. Expected mortality is more than 50 percent.

Windthrow hazard is the likelihood that trees will be uprooted by the wind because the soil is not deep enough for adequate root anchorage. The main

restrictions that affect rooting are a seasonal high water table and the depth to bedrock, a fragipan, or other limiting layers. A rating of *slight* indicates that under normal conditions no trees are blown down by the wind. Strong winds may damage trees, but they do not uproot them. A rating of *moderate* indicates that some trees can be blown down during periods when the soil is wet and winds are moderate or strong. A rating of *severe* indicates that many trees can be blown down during these periods.

The *potential productivity* of merchantable or *common trees* on a soil is expressed as a *site index* and as a *volume* number. The site index is the average height, in feet, that dominant and codominant trees of a given species attain in a specified number of years. The site index applies to fully stocked, even-aged, unmanaged stands (4). Commonly grown trees are those that woodland managers generally favor in intermediate or improvement cuttings. They are selected on the basis of growth rate, quality, value, and marketability.

The *volume*, a number, is the yield likely to be produced by the most important trees. This number, expressed as cubic feet per acre per year, indicates the amount of fiber produced in a fully stocked, even-aged, unmanaged stand.

The first species listed under *common trees* for a soil is the indicator species for that soil. It generally is the most common species on the soil and is the one that determines the ordination class.

Trees to plant are those that are suitable for commercial wood production.

Because logging and harvesting of wood resources is an important part of the economy of the survey area, table 5 is provided to give additional information concerning the operability of harvesting equipment on the soils in the survey area. The woodland manager, woodland owner, or logging operator can use this table to determine how soil conditions may improve during the year and to schedule harvesting and thinning operations for the best time.

Table 5 gives information about operating harvesting or thinning equipment in logging areas and on skid roads, log landings, and haul roads. Limitations are given for the most limiting season and for the preferred season. The *most limiting season* in the survey area generally is spring or late fall. In some places, however, it is during dry periods in summer, when loose sand can limit trafficability on deep, excessively drained to well drained, sandy soils.

The *preferred operating season* is the period when harvesting or thinning causes the least amount of soil damage. This period generally is when the soil is not too wet or when the ground is frozen or partly frozen or has an adequate snow cover.

In table 5, a rating of *slight* indicates that the use of conventional logging equipment is not restricted if normal logging methods are used. A rating of *moderate* indicates that the use of equipment is restricted because of one or more soil factors. If wetness is a limitation, high flotation equipment or special procedures may be needed to prevent the formation of ruts. A rating of *severe* indicates that the kind of equipment that can be used is seriously restricted.

Logging areas and skid roads include areas where some or all of the trees are being cut. Generally, equipment traffic is least intensive in the logging areas. Skid roads, which generally are within the logging area, are roads or trails over which logs are dragged or hauled from the stump to a log landing.

Log landings are areas where logs are assembled for transportation. Wheeled equipment may be used more frequently in these areas than in any other area affected by logging.

Haul roads are access roads leading from primary or surfaced roads to the logging areas. The logging roads serve as transportation routes for wheeled logging equipment and logging trucks. Generally, they are unpaved roads. Some are graveled.

Windbreaks and Environmental Plantings

Windbreaks protect livestock, buildings, and yards from wind and snow. They also protect fruit trees and gardens, and they furnish habitat for wildlife. Several rows of low- and high-growing broadleaf and coniferous trees and shrubs provide the most protection.

Field windbreaks are narrow plantings made at right angles to the prevailing wind and at specific intervals across the field. The interval depends on the erodibility of the soil. Field windbreaks protect cropland and crops from wind, help to keep snow on the fields, and provide food and cover for wildlife.

Environmental plantings help to beautify and screen houses and other buildings and to abate noise. The plants, mostly evergreen shrubs and trees, are closely spaced. To ensure plant survival, a healthy planting stock of suitable species should be planted properly on a well prepared site and maintained in good condition.

Table 6 shows the height that locally grown trees and shrubs are expected to reach in 20 years on various soils. The estimates in table 6 are based on measurements and observation of established plantings that have been given adequate care. They can be used as a guide in planning windbreaks and screens. Additional information on planning windbreaks and screens and planting and caring for trees and shrubs can be obtained from the local office of the Natural

Resources Conservation Service or of the Cooperative Extension Service or from a commercial nursery.

Recreation

The soils of the survey area are rated in table 7 according to limitations that affect their suitability for recreation. The ratings are based on restrictive soil features, such as wetness, slope, and texture of the surface layer. Susceptibility to flooding is considered. Not considered in the ratings, but important in evaluating a site, are the location and accessibility of the area, the size and shape of the area and its scenic quality, vegetation, access to water, potential water impoundment sites, and access to public sewer lines. The capacity of the soil to absorb septic tank effluent and the ability of the soil to support vegetation are also important. Soils subject to flooding are limited for recreational uses by the duration and intensity of flooding and the season when flooding occurs. In planning recreational facilities, onsite assessment of the height, duration, intensity, and frequency of flooding is essential.

In table 7, the degree of soil limitation is expressed as slight, moderate, or severe. *Slight* means that soil properties are generally favorable and that limitations are minor and easily overcome. *Moderate* means that limitations can be overcome or alleviated by planning, design, or special maintenance. *Severe* means that soil properties are unfavorable and that limitations can be offset only by costly soil reclamation, special design, intensive maintenance, limited use, or by a combination of these measures.

The information in table 7 can be supplemented by other information in this publication, for example, interpretations for septic tank absorption fields in table 10 and interpretations for dwellings without basements and for local roads and streets in table 9.

Camp areas require site preparation, such as shaping and leveling the tent and parking areas, stabilizing roads and intensively used areas, and installing sanitary facilities and utility lines. Camp areas are subject to heavy foot traffic and some vehicular traffic. The best soils have mild slopes and are not wet or subject to flooding during the period of use. The surface has few or no stones or boulders, absorbs rainfall readily but remains firm, and is not dusty when dry. Strong slopes and stones or boulders can greatly increase the cost of constructing campsites.

Picnic areas are subject to heavy foot traffic. Most vehicular traffic is confined to access roads and parking areas. The best soils for picnic areas are firm when wet, are not dusty when dry, are not subject to flooding during the period of use, and do not have slopes or

stones or boulders that increase the cost of shaping sites or of building access roads and parking areas.

Playgrounds require soils that can withstand intensive foot traffic. The best soils are almost level and are not wet or subject to flooding during the season of use. The surface is free of stones and boulders, is firm after rains, and is not dusty when dry. If grading is needed, the depth of the soil over bedrock or a hardpan should be considered.

Paths and trails for hiking and horseback riding should require little or no cutting and filling. The best soils are not wet, are firm after rains, are not dusty when dry, and are not subject to flooding more than once a year during the period of use. They have moderate slopes and few or no stones or boulders on the surface.

Wildlife Habitat

Soils affect the kind and amount of vegetation that is available to wildlife as food and cover. They also affect the construction of water impoundments. The kind and abundance of wildlife depend largely on the amount and distribution of food, cover, and water. Wildlife habitat can be created or improved by planting appropriate vegetation, by maintaining the existing plant cover, or by promoting the natural establishment of desirable plants.

In table 8, the soils in the survey area are rated according to their potential for providing habitat for various kinds of wildlife. This information can be used in planning parks, wildlife refuges, nature study areas, and other developments for wildlife; in selecting soils that are suitable for establishing, improving, or maintaining specific elements of wildlife habitat; and in determining the intensity of management needed for each element of the habitat.

The potential of the soil is rated good, fair, poor, or very poor. A rating of *good* indicates that the element or kind of habitat is easily established, improved, or maintained. Few or no limitations affect management, and satisfactory results can be expected. A rating of *fair* indicates that the element or kind of habitat can be established, improved, or maintained in most places. Moderately intensive management is required for satisfactory results. A rating of *poor* indicates that limitations are severe for the designated element or kind of habitat. Habitat can be created, improved, or maintained in most places, but management is difficult and must be intensive. A rating of *very poor* indicates that restrictions for the element or kind of habitat are very severe and that unsatisfactory results can be expected. Creating, improving, or maintaining habitat is impractical or impossible.

The elements of wildlife habitat are described in the following paragraphs.

Grain and seed crops are domestic grains and seed-producing herbaceous plants. Soil properties and features that affect the growth of grain and seed crops are depth of the root zone, texture of the surface layer, available water capacity, wetness, slope, surface stoniness, and flooding. Soil temperature and soil moisture are also considerations. Examples of grain and seed crops are corn, sorghum, wheat, and oats.

Grasses and legumes are domestic perennial grasses and herbaceous legumes. Soil properties and features that affect the growth of grasses and legumes are depth of the root zone, texture of the surface layer, available water capacity, wetness, surface stoniness, flooding, and slope. Soil temperature and soil moisture are also considerations. Examples of grasses and legumes are orchardgrass, switchgrass, white clover, and alfalfa.

Wild herbaceous plants are native or naturally established grasses and forbs, including weeds. Soil properties and features that affect the growth of these plants are depth of the root zone, texture of the surface layer, available water capacity, wetness, surface stoniness, and flooding. Soil temperature and soil moisture are also considerations. Examples of wild herbaceous plants are big bluestem, goldenrod, Canada wildrye, Canada mayflower, and bunchberry.

Hardwood trees and woody understory produce nuts or other fruit, buds, catkins, twigs, bark, and foliage. Soil properties and features that affect the growth of hardwood trees and shrubs are depth of the root zone, available water capacity, and wetness. Examples of these plants are oak, poplar, pin cherry, apple, hawthorn, dogwood, hickory, blackberry, and blueberry.

Coniferous plants furnish browse and seeds. Soil properties and features that affect the growth of coniferous trees, shrubs, and ground cover are depth of the root zone, available water capacity, and wetness. Examples of coniferous plants are pine, spruce, fir, cedar, and juniper.

Wetland plants are annual and perennial wild herbaceous plants that grow on moist or wet sites. Submerged or floating aquatic plants are excluded. Soil properties and features affecting wetland plants are texture of the surface layer, wetness, reaction, salinity, slope, and surface stoniness. Examples of wetland plants are smartweed, wild millet, wildrice, rushes, sedges, and reeds.

Shallow water areas have an average depth of less than 5 feet. Some are naturally wet areas. Others are created by dams, levees, or other water-control structures. Soil properties and features affecting shallow water areas are depth to bedrock, wetness, surface stoniness, slope, and permeability. Examples of shallow

water areas are marshes, waterfowl feeding areas, and ponds.

The habitat for various kinds of wildlife is described in the following paragraphs.

Habitat for openland wildlife consists of cropland, pasture, meadows, and areas that are overgrown with grasses, herbs, shrubs, and vines. These areas produce grain and seed crops, grasses and legumes, and wild herbaceous plants. Wildlife attracted to these areas include pheasant, meadowlark, field sparrow, cottontail, and red fox.

Habitat for woodland wildlife consists of areas of deciduous plants or coniferous plants or both and associated grasses, legumes, and wild herbaceous plants. Wildlife attracted to these areas include ruffed grouse, woodcock, thrushes, woodpeckers, squirrels, gray fox, raccoon, deer, and bear.

Habitat for wetland wildlife consists of open, marshy or swampy shallow water areas. Some of the wildlife attracted to such areas are ducks, geese, herons, shore birds, muskrat, mink, and beaver.

Engineering

This section provides information for planning land uses related to urban development and to water management. Soils are rated for various uses, and the most limiting features are identified. Ratings are given for building site development, sanitary facilities, construction materials, and water management. The ratings are based on observed performance of the soils and on the estimated data and test data in the "Soil Properties" section.

Information in this section is intended for land use planning, for evaluating land use alternatives, and for planning site investigations prior to design and construction. The information, however, has limitations. For example, estimates and other data generally apply only to that part of the soil within a depth of 5 or 6 feet. Because of the map scale, small areas of different soils may be included within the mapped areas of a specific soil.

The information is not site specific and does not eliminate the need for onsite investigation of the soils or for testing and analysis by personnel experienced in the design and construction of engineering works.

Government ordinances and regulations that restrict certain land uses or impose specific design criteria were not considered in preparing the information in this section. Local ordinances and regulations should be considered in planning, in site selection, and in design.

Soil properties, site features, and observed performance were considered in determining the ratings

in this section. During the fieldwork for the soil survey, determinations were made about grain-size distribution, liquid limit, plasticity index, soil reaction, depth to bedrock, hardness of bedrock within 5 or 6 feet of the surface, soil wetness, depth to a seasonal high water table, slope, likelihood of flooding, natural soil structure aggregation, and soil density. Data were collected about kinds of clay minerals, mineralogy of the sand and silt fractions, and the kinds of adsorbed cations. Estimates were made for erodibility, permeability, corrosivity, shrink-swell potential, available water capacity, and other behavioral characteristics affecting engineering uses.

This information can be used to evaluate the potential of areas for residential, commercial, industrial, and recreational uses; make preliminary estimates of construction conditions; evaluate alternative routes for roads, streets, highways, pipelines, and underground cables; evaluate alternative sites for sanitary landfills, septic tank absorption fields, and sewage lagoons; plan detailed onsite investigations of soils and geology; locate potential sources of gravel, sand, earthfill, and topsoil; plan drainage systems, irrigation systems, ponds, terraces, and other structures for soil and water conservation; and predict performance of proposed small structures and pavements by comparing the performance of existing similar structures on the same or similar soils.

The information in the tables, along with the soil maps, the soil descriptions, and other data provided in this publication, can be used to make additional interpretations.

Some of the terms used in this publication have a special meaning in soil science and are defined in the "Glossary."

Building Site Development

Table 9 shows the degree and kind of soil limitations that affect shallow excavations, dwellings with and without basements, small commercial buildings, local roads and streets, and lawns and landscaping. The limitations are considered *slight* if soil properties and site features are generally favorable for the indicated use and limitations are minor and easily overcome; *moderate* if soil properties or site features are not favorable for the indicated use and special planning, design, or maintenance is needed to overcome or minimize the limitations; and *severe* if soil properties or site features are so unfavorable or so difficult to overcome that special design, significant increases in construction costs, and possibly increased maintenance are required. Special feasibility studies may be required where the soil limitations are severe.

Shallow excavations are trenches or holes dug to a maximum depth of 5 or 6 feet for basements, graves, utility lines, open ditches, and other purposes. The ratings are based on soil properties, site features, and observed performance of the soils. The ease of digging, filling, and compacting is affected by the depth to bedrock, a cemented pan, or a very firm dense layer; stone content; soil texture; and slope. The time of the year that excavations can be made is affected by the depth to a seasonal high water table and the susceptibility of the soil to flooding. The resistance of the excavation walls or banks to sloughing or caving is affected by soil texture and depth to the water table.

Dwellings and small commercial buildings are structures built on shallow foundations on undisturbed soil. The load limit is the same as that for single-family dwellings no higher than three stories. Ratings are made for small commercial buildings without basements, for dwellings with basements, and for dwellings without basements. The ratings are based on soil properties, site features, and observed performance of the soils. A high water table, flooding, shrinking and swelling, and organic layers can cause the movement of footings. A high water table, depth to bedrock or to a cemented pan, large stones, slope, and flooding affect the ease of excavation and construction. Landscaping and grading that require cuts and fills of more than 5 or 6 feet are not considered.

Local roads and streets have an all-weather surface and carry automobile and light truck traffic all year. They have a subgrade of cut or fill soil material; a base of gravel, crushed rock, or stabilized soil material; and a flexible or rigid surface. Cuts and fills are generally limited to less than 6 feet. The ratings are based on soil properties, site features, and observed performance of the soils. Depth to bedrock or to a cemented pan, a high water table, flooding, large stones, and slope affect the ease of excavating and grading. Soil strength (as inferred from the engineering classification of the soil), shrink-swell potential, frost action potential, and depth to a high water table affect the traffic-supporting capacity.

Lawns and landscaping require soils on which turf and ornamental trees and shrubs can be established and maintained. The ratings are based on soil properties, site features, and observed performance of the soils. Soil reaction, a high water table, depth to bedrock or to a cemented pan, the available water capacity in the upper 40 inches, and the content of salts, sodium, and sulfidic materials affect plant growth. Flooding, wetness, slope, stoniness, and the amount of sand, clay, or organic matter in the surface layer affect trafficability after vegetation is established.

Sanitary Facilities

Table 10 shows the degree and kind of soil limitations that affect septic tank absorption fields, sewage lagoons, and sanitary landfills. The limitations are considered *slight* if soil properties and site features are generally favorable for the indicated use and limitations are minor and easily overcome; *moderate* if soil properties or site features are not favorable for the indicated use and special planning, design, or maintenance is needed to overcome or minimize the limitations; and *severe* if soil properties or site features are so unfavorable or so difficult to overcome that special design, significant increases in construction costs, and possibly increased maintenance are required.

Table 10 also shows the suitability of the soils for use as daily cover for landfill. A rating of *good* indicates that soil properties and site features are favorable for the use and good performance and low maintenance can be expected; *fair* indicates that soil properties and site features are moderately favorable for the use and one or more soil properties or site features make the soil less desirable than the soils rated *good*; and *poor* indicates that one or more soil properties or site features are unfavorable for the use and overcoming the unfavorable properties requires special design, extra maintenance, or costly alteration.

Septic tank absorption fields are areas in which effluent from a septic tank is distributed into the soil through subsurface tiles or perforated pipe. Only that part of the soil between depths of 24 and 72 inches is evaluated. The ratings are based on soil properties, site features, and observed performance of the soils. Permeability, a high water table, depth to bedrock or to a cemented pan, and flooding affect absorption of the effluent. Large stones and bedrock or a cemented pan interfere with installation.

Unsatisfactory performance of septic tank absorption fields, including excessively slow absorption of effluent, surfacing of effluent, and hillside seepage, can affect public health. Ground water can be polluted if highly permeable sand and gravel or fractured bedrock is less than 4 feet below the base of the absorption field, if slope is excessive, or if the water table is near the surface. There must be unsaturated soil material beneath the absorption field to filter the effluent effectively. Many local ordinances require that this material be of a certain thickness.

Sewage lagoons are shallow ponds constructed to hold sewage while aerobic bacteria decompose the solid and liquid wastes. Lagoons should have a nearly level floor surrounded by cut slopes or embankments of compacted soil. Lagoons generally are designed to hold

the sewage within a depth of 2 to 5 feet. Nearly impervious soil material for the lagoon floor and sides is required to minimize seepage and contamination of ground water.

Table 10 gives ratings for the natural soil that makes up the lagoon floor. The surface layer and, generally, 1 or 2 feet of soil material below the surface layer are excavated to provide material for the embankments. The ratings are based on soil properties, site features, and observed performance of the soils. Considered in the ratings are slope, permeability, a high water table, depth to bedrock or to a cemented pan, flooding, large stones, and content of organic matter.

Excessive seepage resulting from rapid permeability in the soil or a water table that is high enough to raise the level of sewage in the lagoon causes a lagoon to function unsatisfactorily. Pollution results if seepage is excessive or if floodwater overtops the lagoon. A high content of organic matter is detrimental to proper functioning of the lagoon because it inhibits aerobic activity. Slope, bedrock, and cemented pans can cause construction problems, and large stones can hinder compaction of the lagoon floor.

Sanitary landfills are areas where solid waste is disposed of by burying it in soil. There are two types of landfill—trench and area. In a trench landfill, the waste is placed in a trench. It is spread, compacted, and covered daily with a thin layer of soil excavated at the site. In an area landfill, the waste is placed in successive layers on the surface of the soil. The waste is spread, compacted, and covered daily with a thin layer of soil from a source away from the site.

Both types of landfill must be able to bear heavy vehicular traffic. Both types involve a risk of ground-water pollution. Ease of excavation and revegetation should be considered.

The ratings in table 10 are based on soil properties, site features, and observed performance of the soils. Permeability, depth to bedrock or to a cemented pan, a high water table, slope, and flooding affect both types of landfill. Texture, stones and boulders, highly organic layers, soil reaction, and content of salts and sodium affect trench landfills. Unless otherwise stated, the ratings apply only to that part of the soil within a depth of about 6 feet. For deeper trenches, a limitation rated slight or moderate may not be valid. Onsite investigation is needed.

Daily cover for landfill is the soil material that is used to cover compacted solid waste in an area sanitary landfill. The soil material is obtained offsite, transported to the landfill, and spread over the waste.

Soil texture, wetness, coarse fragments, and slope affect the ease of removing and spreading the material during wet and dry periods. Loamy or silty soils that are

free of large stones or excess gravel are the best cover for a landfill. Clayey soils are sticky or cloddy and are difficult to spread; sandy soils are subject to soil blowing.

After soil material has been removed, the soil material remaining in the borrow area must be thick enough over bedrock, a cemented pan, or the water table to permit revegetation. The soil material used as final cover for a landfill should be suitable for plants. The surface layer generally has the best workability, more organic matter, and the best potential for plants. Material from the surface layer should be stockpiled for use as the final cover.

Construction Materials

Table 11 gives information about the soils as a source of roadfill, sand, gravel, and topsoil. The soils are rated *good*, *fair*, or *poor* as a source of roadfill and topsoil. They are rated as a *probable* or *improbable* source of sand and gravel. The ratings are based on soil properties and site features that affect the removal of the soil and its use as construction material. Normal compaction, minor processing, and other standard construction practices are assumed. Each soil is evaluated to a depth of 5 or 6 feet.

Roadfill is soil material that is excavated in one place and used in road embankments in another place. In this table, the soils are rated as a source of roadfill for low embankments, generally less than 6 feet high and less exacting in design than higher embankments.

The ratings are for the soil material below the surface layer to a depth of 5 or 6 feet. It is assumed that soil layers will be mixed during excavating and spreading. Many soils have layers of contrasting suitability within their profile. The table showing engineering index properties provides detailed information about each soil layer. This information can help to determine the suitability of each layer for use as roadfill. The performance of soil after it is stabilized with lime or cement is not considered in the ratings.

The ratings are based on soil properties, site features, and observed performance of the soils. The thickness of suitable material is a major consideration. The ease of excavation is affected by large stones, a high water table, and slope. How well the soil performs in place after it has been compacted and drained is determined by its strength (as inferred from the engineering classification of the soil) and shrink-swell potential.

Soils rated *good* contain significant amounts of sand or gravel or both. They have at least 5 feet of suitable material, a low shrink-swell potential, few cobbles and stones, and slopes of 15 percent or less. Depth to the water table is more than 3 feet. Soils rated *fair* are more

than 35 percent silt- and clay-sized particles and have a plasticity index of less than 10. They have a moderate shrink-swell potential, slopes of 15 to 25 percent, or many stones. Depth to the water table is 1 to 3 feet. Soils rated *poor* have a plasticity index of more than 10, a high shrink-swell potential, many stones, or slopes of more than 25 percent. They are wet and have a water table at a depth of less than 1 foot. They may have layers of suitable material, but the material is less than 3 feet thick.

Sand and gravel are natural aggregates suitable for commercial use with a minimum of processing. They are used in many kinds of construction. Specifications for each use vary widely. In table 11, only the probability of finding material in suitable quantity is evaluated. The suitability of the material for specific purposes is not evaluated, nor are factors that affect excavation of the material.

The properties used to evaluate the soil as a source of sand or gravel are gradation of grain sizes (as indicated by the engineering classification of the soil), the thickness of suitable material, and the content of rock fragments. Kinds of rock, acidity, and stratification are given in the soil series descriptions. Gradation of grain sizes is given in the table on engineering index properties.

A soil rated as a probable source has a layer of clean sand or gravel or a layer of sand or gravel that is up to 12 percent silty fines. This material must be at least 3 feet thick and less than 50 percent, by weight, large stones. All other soils are rated as an improbable source. Coarse fragments of soft bedrock, such as shale and siltstone, are not considered to be sand and gravel.

Topsoil is used to cover an area so that vegetation can be established and maintained. The upper 40 inches of a soil is evaluated for use as topsoil. Also evaluated is the reclamation potential of the borrow area.

Plant growth is affected by toxic material and by such properties as soil reaction, available water capacity, and fertility. The ease of excavating, loading, and spreading is affected by rock fragments, slope, a water table, soil texture, and thickness of suitable material. Reclamation of the borrow area is affected by slope, a water table, rock fragments, bedrock, and toxic material.

Soils rated *good* have friable, loamy material to a depth of at least 40 inches. They are free of stones and cobbles, have little or no gravel, and have slopes of less than 8 percent. They are low in content of soluble salts, are naturally fertile or respond well to fertilizer, and are not so wet that excavation is difficult.

Soils rated *fair* are sandy soils, loamy soils that have a relatively high content of clay, soils that have only 20

to 40 inches of suitable material, soils that have an appreciable amount of gravel, stones, or soluble salts, or soils that have slopes of 8 to 15 percent. The soils are not so wet that excavation is difficult.

Soils rated *poor* are very sandy or clayey, have less than 20 inches of suitable material, have a large amount of gravel, stones, or soluble salts, have slopes of more than 15 percent, or have a seasonal high water table at or near the surface.

The surface layer of most soils is generally preferred for topsoil because of its organic matter content. Organic matter greatly increases the absorption and retention of moisture and nutrients for plant growth.

Water Management

Table 12 gives information on the soil properties and site features that affect water management. The degree and kind of soil limitations are given for pond reservoir areas; embankments, dikes, and levees; and aquifer-fed excavated ponds. The limitations are considered *slight* if soil properties and site features are generally favorable for the indicated use and limitations are minor and are easily overcome; *moderate* if soil properties or site features are not favorable for the indicated use and special planning, design, or maintenance is needed to overcome or minimize the limitations; and *severe* if soil properties or site features are so unfavorable or so difficult to overcome that special design, significant increase in construction costs, and possibly increased maintenance are required.

This table also gives for each soil the restrictive features that affect drainage, irrigation, and grassed waterways.

Pond reservoir areas hold water behind a dam or embankment. Soils best suited to this use have low seepage potential in the upper 60 inches. The seepage potential is determined by the permeability of the soil and the depth to fractured bedrock or other permeable material. Excessive slope can affect the storage capacity of the reservoir area.

Embankments, dikes, and levees are raised structures of soil material, generally less than 20 feet high, constructed to impound water or to protect land against overflow. In this table, the soils are rated as a source of material for embankment fill. The ratings apply to the soil material below the surface layer to a depth of about 5 feet. It is assumed that soil layers will be uniformly mixed and compacted during construction.

The ratings do not indicate the ability of the natural soil to support an embankment. Soil properties to a depth even greater than the height of the embankment can affect performance and safety of the embankment.

Generally, deeper onsite investigation is needed to determine these properties.

Soil material in embankments must be resistant to seepage, piping, and erosion and have favorable compaction characteristics. Unfavorable features include less than 5 feet of suitable material and a high content of stones or boulders or organic matter. A high water table affects the amount of usable material. It also affects trafficability.

Aquifer-fed excavated ponds are pits or dugouts that extend to a ground-water aquifer or to a depth below a permanent water table. Excluded are ponds that are fed only by surface runoff and embankment ponds that impound water 3 feet or more above the original surface. Excavated ponds are affected by depth to a permanent water table, permeability of the aquifer, and quality of the water as inferred from the salinity of the soil. Depth to bedrock and the content of large stones affect the ease of excavation.

Drainage is the removal of excess surface and subsurface water from the soil. How easily and effectively the soil is drained depends on the depth to bedrock, to a cemented pan, or to other layers that affect the rate of water movement; permeability; depth to a high water table or depth of standing water if the soil is subject to ponding; slope; susceptibility to flooding; subsidence of organic layers; and the potential for frost action. Excavating and grading and the stability of ditchbanks are affected by depth to bedrock or to a cemented pan, large stones, slope, and the hazard of cutbanks caving. Availability of drainage outlets is not considered in the ratings.

Irrigation is the controlled application of water to supplement rainfall and support plant growth. The design and management of an irrigation system are affected by depth to the water table, the need for drainage, flooding, available water capacity, intake rate, permeability, erosion hazard, and slope. The construction of a system is affected by large stones and depth to bedrock or to a cemented pan. The performance of a system is affected by the depth of the root zone and soil reaction.

Grassed waterways are natural or constructed channels, generally broad and shallow, that conduct surface water to outlets at a nonerosive velocity. Large stones, wetness, slope, and depth to bedrock or to a cemented pan affect the construction of grassed waterways. A hazard of soil blowing, low available water capacity, restricted rooting depth, and restricted permeability adversely affect the growth and maintenance of the grass after construction.

Soil Properties

Data relating to soil properties are collected during the course of the soil survey. The data and the estimates of soil and water features, listed in tables, are explained on the following pages.

Soil properties are determined by field examination of the soils and by laboratory index testing of some benchmark soils. Established standard procedures are followed. During the survey, many shallow borings are made and examined to identify and classify the soils and to delineate them on the soil maps. Samples are taken from some typical profiles and tested in the laboratory to determine grain-size distribution, plasticity, and compaction characteristics.

Estimates of soil properties are based on field examinations, on laboratory tests of samples from the survey area, and on laboratory tests of samples of similar soils in nearby areas. Tests verify field observations, verify properties that cannot be estimated accurately by field observation, and help to characterize key soils.

The estimates of soil properties shown in the tables include the range of grain-size distribution and Atterberg limits, the engineering classification, and the physical and chemical properties of the major layers of each soil. Pertinent soil and water features also are given.

Engineering Index Properties

Table 13 gives estimates of the engineering classification and of the range of index properties for the major layers of each soil in the survey area. Most soils have layers of contrasting properties within the upper 5 or 6 feet.

Depth to the upper and lower boundaries of each layer is indicated. The range in depth and information on other properties of each layer are given for each soil series under the heading "Descriptions of the Soils" in the original survey.

Texture is given in the standard terms used by the U.S. Department of Agriculture. These terms are defined according to percentages of sand, silt, and clay in the fraction of the soil that is less than 2 millimeters in diameter (fig. 1). "Loam," for example, is soil that is 7

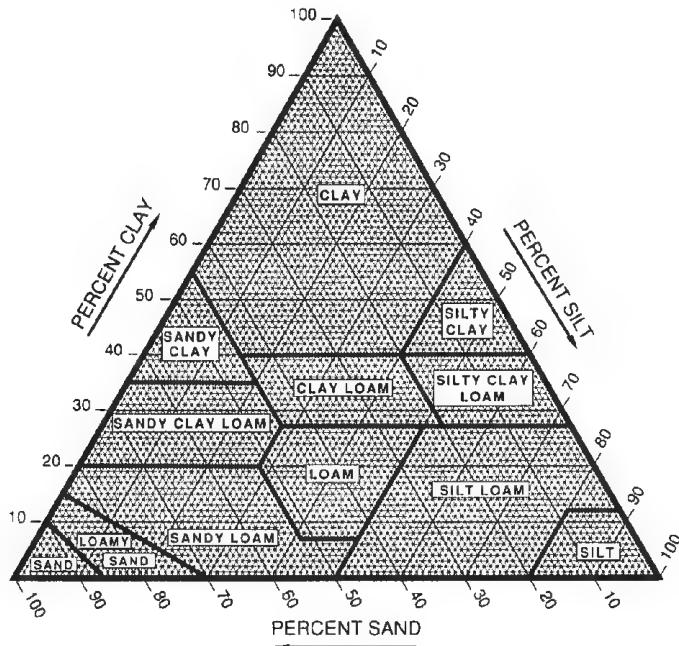


Figure 1.—Percentages of clay, silt, and sand in the basic USDA soil textural classes.

to 27 percent clay, 28 to 50 percent silt, and less than 52 percent sand. If the content of particles coarser than sand is as much as about 15 percent, an appropriate modifier is added, for example, "gravelly." Textural terms are defined in the "Glossary."

Classification of the soils is determined according to the Unified soil classification system (2) and the system adopted by the American Association of State Highway and Transportation Officials (1).

The Unified system classifies soils according to properties that affect their use as construction material. Soils are classified according to grain-size distribution of the fraction less than 3 inches in diameter and according to plasticity index, liquid limit, and organic matter content. Sandy and gravelly soils are identified as GW, GP, GM, GC, SW, SP, SM, and SC; silty and clayey soils as ML, CL, OL, MH, CH, and OH; and

highly organic soils as PT. Soils exhibiting engineering properties of two groups can have a dual classification, for example, CL-ML.

The AASHTO system classifies soils according to those properties that affect roadway construction and maintenance. In this system, the fraction of a mineral soil that is less than 3 inches in diameter is classified in one of seven groups from A-1 through A-7 on the basis of grain-size distribution, liquid limit, and plasticity index. Soils in group A-1 are coarse grained and low in content of fines (silt and clay). At the other extreme, soils in group A-7 are fine grained. Highly organic soils are classified in group A-8 on the basis of visual inspection.

If laboratory data are available, the A-1, A-2, and A-7 groups are further classified as A-1-a, A-1-b, A-2-4, A-2-5, A-2-6, A-2-7, A-7-5, or A-7-6. As an additional refinement, the suitability of a soil as subgrade material can be indicated by a group index number. Group index numbers range from 0 for the best subgrade material to 20 or higher for the poorest.

Rock fragments larger than 10 inches in diameter and 3 to 10 inches in diameter are indicated as a percentage of the total soil on a dry-weight basis. The percentages are estimates determined mainly by converting volume percentage in the field to weight percentage.

Percentage (of soil particles) passing designated sieves is the percentage of the soil fraction less than 3 inches in diameter based on an ovendry weight. The sieves, numbers 4, 10, 40, and 200 (USA Standard Series), have openings of 4.76, 2.00, 0.420, and 0.074 millimeters, respectively. Estimates are based on laboratory tests of soils sampled in the survey area and in nearby areas and on estimates made in the field.

Liquid limit and plasticity index (Atterberg limits) indicate the plasticity characteristics of a soil. The estimates are based on test data from the survey area or from nearby areas and on field examination.

The estimates of grain-size distribution, liquid limit, and plasticity index are generally rounded to the nearest 5 percent. Thus, if the ranges of gradation and Atterberg limits extend a marginal amount (1 or 2 percentage points) across classification boundaries, the classification in the marginal zone is omitted in the table.

Physical and Chemical Properties

Table 14 shows estimates of some characteristics and features that affect soil behavior. These estimates are given for the major layers of each soil in the survey area. The estimates are based on field observations and on test data for these and similar soils.

Clay as a soil separate consists of mineral soil particles that are less than 0.002 millimeter in diameter. In this table, the estimated clay content of each major soil layer is given as a percentage, by weight, of the soil material that is less than 2 millimeters in diameter.

The amount and kind of clay greatly affect the fertility and physical condition of the soil. They determine the ability of the soil to adsorb cations and to retain moisture. They influence shrink-swell potential, permeability, plasticity, the ease of soil dispersion, and other soil properties. The amount and kind of clay in a soil also affect tillage and earthmoving operations.

Moist bulk density is the weight of soil (ovendry) per unit volume. Volume is measured when the soil is at field moisture capacity, that is, the moisture content at $\frac{1}{3}$ -bar moisture tension. Weight is determined after drying the soil at 105 degrees C. In this table, the estimated moist bulk density of each major soil horizon is expressed in grams per cubic centimeter of soil material that is less than 2 millimeters in diameter. Bulk density data are used to compute shrink-swell potential, available water capacity, total pore space, and other soil properties. The moist bulk density of a soil indicates the pore space available for water and roots. A bulk density of more than 1.6 can restrict water storage and root penetration. Moist bulk density is influenced by texture, kind of clay, content of organic matter, and soil structure.

Permeability refers to the ability of a soil to transmit water or air (8). The estimates indicate the rate of downward movement of water when the soil is saturated. They are based on soil characteristics observed in the field, particularly structure, porosity, and texture. Permeability is considered in the design of soil drainage systems and septic tank absorption fields.

Available water capacity refers to the quantity of water that the soil is capable of storing for use by plants. The capacity for water storage is given in inches of water per inch of soil for each major soil layer. The capacity varies, depending on soil properties that affect the retention of water and the depth of the root zone. The most important properties are the content of organic matter, soil texture, bulk density, and soil structure. Available water capacity is an important factor in the choice of plants or crops to be grown and in the design and management of irrigation systems. Available water capacity is not an estimate of the quantity of water actually available to plants at any given time.

Soil reaction is a measure of acidity or alkalinity and is expressed as a range in pH values. The range in pH of each major horizon is based on many field tests. For many soils, values have been verified by laboratory analyses. Soil reaction is important in selecting crops and other plants, in evaluating soil amendments for

fertility and stabilization, and in determining the risk of corrosion.

Shrink-swell potential is the potential for volume change in a soil with a loss or gain in moisture. Volume change occurs mainly because of the interaction of clay minerals with water and varies with the amount and type of clay minerals in the soil. The size of the load on the soil and the magnitude of the change in soil moisture content influence the amount of swelling of soils in place. Laboratory measurements of swelling of undisturbed clods were made for many soils. For others, swelling was estimated on the basis of the kind and amount of clay minerals in the soil and on measurements of similar soils.

If the shrink-swell potential is rated moderate to very high, shrinking and swelling can cause damage to buildings, roads, and other structures. Special design is often needed.

Shrink-swell potential classes are based on the change in length of an unconfined clod as moisture content is increased from air-dry to field capacity. The classes are *low*, a change of less than 3 percent; *moderate*, 3 to 6 percent; *high*, more than 6 percent; and *very high*, greater than 9 percent.

Erosion factor K indicates the susceptibility of a soil to sheet and rill erosion by water. Factor K is one of six factors used in the Universal Soil Loss Equation (USLE) to predict the average annual rate of soil loss by sheet and rill erosion in tons per acre per year. The estimates are based primarily on percentage of silt, sand, and organic matter (up to 4 percent) and on soil structure and permeability. Values of K range from 0.02 to 0.64. Other factors being equal, the higher the value, the more susceptible the soil is to sheet and rill erosion by water.

Erosion factor T is an estimate of the maximum average annual rate of soil erosion by wind or water that can occur without affecting crop productivity over a sustained period. The rate is in tons per acre per year.

Wind erodibility groups are made up of soils that have similar properties affecting their resistance to soil blowing in cultivated areas. The groups indicate the susceptibility to soil blowing. The soils assigned to group 1 are the most susceptible to soil blowing, and those assigned to group 8 are the least susceptible. The groups are as follows:

1. Coarse sands, sands, fine sands, and very fine sands.
2. Loamy coarse sands, loamy sands, loamy fine sands, loamy very fine sands, ash material, and sapric soil material.
3. Coarse sandy loams, sandy loams, fine sandy loams, and very fine sandy loams.

4L. Calcareous loams, silt loams, clay loams, and silty clay loams.

4. Clays, silty clays, noncalcareous clay loams, and silty clay loams that are more than 35 percent clay.

5. Noncalcareous loams and silt loams that are less than 20 percent clay and sandy clay loams, sandy clays, and hemic soil material.

6. Noncalcareous loams and silt loams that are more than 20 percent clay and noncalcareous clay loams that are less than 35 percent clay.

7. Silts, noncalcareous silty clay loams that are less than 35 percent clay, and fibric soil material.

8. Soils that are not subject to soil blowing because of coarse fragments on the surface or because of surface wetness.

Organic matter is the plant and animal residue in the soil at various stages of decomposition. In table 14, the estimated content of organic matter is expressed as a percentage, by weight, of the soil material that is less than 2 millimeters in diameter.

The content of organic matter in a soil can be maintained or increased by returning crop residue to the soil. Organic matter affects the available water capacity, infiltration rate, and tilth. It is a source of nitrogen and other nutrients for crops.

Soil and Water Features

Table 15 gives estimates of various soil and water features. The estimates are used in land use planning that involves engineering considerations.

Hydrologic soil groups are based on estimates of runoff potential. Soils are assigned to one of four groups according to the rate of water infiltration when the soils are not protected by vegetation, are thoroughly wet, and receive precipitation from long-duration storms.

The four hydrologic soil groups are:

Group A. Soils having a high infiltration rate (low runoff potential) when thoroughly wet. These consist mainly of deep, well drained to excessively drained sands or gravelly sands. These soils have a high rate of water transmission.

Group B. Soils having a moderate infiltration rate when thoroughly wet. These consist chiefly of moderately deep or deep, moderately well drained or well drained soils that have moderately fine texture to moderately coarse texture. These soils have a moderate rate of water transmission.

Group C. Soils having a slow infiltration rate when thoroughly wet. These consist chiefly of soils having a layer that impedes the downward movement of water or soils of moderately fine texture or fine texture. These soils have a slow rate of water transmission.

Group D. Soils having a very slow infiltration rate

(high runoff potential) when thoroughly wet. These consist chiefly of clays that have a high shrink-swell potential, soils that have a high water table, soils that have a claypan or clay layer at or near the surface, and soils that are shallow over nearly impervious material. These soils have a very slow rate of water transmission.

If a soil is assigned to two hydrologic groups in table 15, the first letter is for drained areas and the second is for undrained areas.

Flooding, the temporary inundation of an area, is caused by overflowing streams, by runoff from adjacent slopes, or by tides. Water standing for short periods after rainfall or snowmelt is not considered flooding, and water standing in swamps and marshes is considered ponding rather than flooding.

Table 15 gives the frequency and duration of flooding and the time of year when flooding is most likely.

Frequency, duration, and probable dates of occurrence are estimated. Frequency is expressed as none, rare, occasional, and frequent. *None* means that flooding is not probable; *rare* that it is unlikely but possible under unusual weather conditions (the chance of flooding is nearly 0 percent to 5 percent in any year); *occasional* that it occurs, on the average, once or less in 2 years (the chance of flooding is 5 to 50 percent in any year); and *frequent* that it occurs, on the average, more than once in 2 years (the chance of flooding is more than 50 percent in any year). *Common* is used when the occasional and frequent classes are grouped for certain purposes. Duration is expressed as *very brief* if less than 2 days, *brief* if 2 to 7 days, *long* if 7 days to 1 month, and *very long* if more than 1 month. Probable dates are expressed in months. About two-thirds to three-fourths of all flooding occurs during the stated period.

The information is based on evidence in the soil profile, namely thin strata of gravel, sand, silt, or clay deposited by floodwater; irregular decrease in organic matter content with increasing depth; and little or no horizon development.

Also considered are local information about the extent and levels of flooding and the relation of each soil on the landscape to historic floods. Information on the extent of flooding based on soil data is less specific than that provided by detailed engineering surveys that delineate flood-prone areas at specific flood frequency levels.

High water table (seasonal) is the highest level of a saturated zone in the soil in most years. The estimates are based mainly on observations of the water table at selected sites and on the evidence of a saturated zone, namely grayish colors or mottles (redoximorphic features) in the soil. Indicated in table 15 are the depth to the seasonal high water table; the kind of water

table—that is, perched, apparent, or artesian; and the months of the year that the water table commonly is high. A water table that is seasonally high for less than 1 month is not indicated in table 15.

An *apparent* water table is a thick zone of free water in the soil. It is indicated by the level at which water stands in an uncased borehole after adequate time is allowed for adjustment in the surrounding soil. A *perched* water table is water standing above an unsaturated zone. In places an upper, or perched, water table is separated from a lower one by a dry zone. An *artesian* water table is under hydrostatic head, generally below an impermeable layer. When this layer is penetrated, the water level rises in an uncased borehole.

Two numbers in the column showing depth to the water table indicate the normal range in depth to a saturated zone. Depth is given to the nearest half foot. The first numeral in the range indicates the highest water level. A plus sign preceding the range in depth indicates that the water table is above the surface of the soil. "More than 6.0" indicates that the water table is below a depth of 6 feet or that it is within a depth of 6 feet for less than a month.

Depth to bedrock is given if bedrock is within a depth of 5 feet. The depth is based on many soil borings and on observations during soil mapping. The rock is either soft or hard. If the rock is soft or fractured, excavations can be made with trenching machines, backhoes, or small rippers. If the rock is hard or massive, blasting or special equipment generally is needed for excavation.

Potential frost action is the likelihood of upward or lateral expansion of the soil caused by the formation of segregated ice lenses (frost heave) and the subsequent collapse of the soil and loss of strength on thawing. Frost action occurs when moisture moves into the freezing zone of the soil. Temperature, texture, density, permeability, content of organic matter, and depth to the water table are the most important factors considered in evaluating the potential for frost action. It is assumed that the soil is not insulated by vegetation or snow and is not artificially drained. Silty and highly structured, clayey soils that have a high water table in winter are the most susceptible to frost action. Well drained, very gravelly, or very sandy soils are the least susceptible. Frost heave and low soil strength during thawing cause damage mainly to pavements and other rigid structures.

Risk of corrosion pertains to potential soil-induced electrochemical or chemical action that dissolves or weakens uncoated steel or concrete. The rate of corrosion of uncoated steel is related to such factors as soil moisture, particle-size distribution, acidity, and electrical conductivity of the soil. The rate of corrosion of concrete is based mainly on the sulfate and sodium

content, texture, moisture content, and acidity of the soil. Special site examination and design may be needed if the combination of factors results in a severe hazard of corrosion. The steel in installations that intersect soil boundaries or soil layers is more susceptible to corrosion than steel in installations that are entirely within one kind of soil or within one soil layer.

For uncoated steel, the risk of corrosion, expressed as *low*, *moderate*, or *high*, is based on soil drainage class, total acidity, electrical resistivity near field capacity, and electrical conductivity of the saturation extract.

For concrete, the risk of corrosion is also expressed as *low*, *moderate*, or *high*. It is based on soil texture, acidity, and amount of sulfates in the saturation extract.

Classification of the Soils

The system of soil classification used by the National Cooperative Soil Survey has six categories (6, 7). Beginning with the broadest, these categories are the order, suborder, great group, subgroup, family, and series. Classification is based on soil properties observed in the field or inferred from those observations or from laboratory measurements. Table 16 shows the classification of the soils in the survey area. The categories are defined in the following paragraphs.

ORDER. Eleven soil orders are recognized. The differences among orders reflect the dominant soil-forming processes and the degree of soil formation. Each order is identified by a word ending in *sol*. An example is Spodosol.

SUBORDER. Each order is divided into suborders primarily on the basis of properties that influence soil genesis and are important to plant growth or properties that reflect the most important variables within the orders. The last syllable in the name of a suborder indicates the order. An example is Orthod (*Orth*, meaning true, plus *od*, from Spodosol).

GREAT GROUP. Each suborder is divided into great groups on the basis of close similarities in kind, arrangement, and degree of development of pedogenic horizons; soil moisture and temperature regimes; type of saturation; and base status. Each great group is identified by the name of a suborder and by a prefix that indicates a property of the soil. An example is Haplorthods (*Hapl*, meaning minimal horizonation, plus

orthod, the common or true suborder of the Spodosols).

SUBGROUP. Each great group has a typic subgroup. Other subgroups are intergrades or extragrades. The typic subgroup is the central concept of the great group; it is not necessarily the most extensive. Intergrades are transitions to other orders, suborders, or great groups. Extragrades have some properties that are not representative of the great group but do not indicate transitions to any other taxonomic class. Each subgroup is identified by one or more adjectives preceding the name of the great group. The adjective *Typic* identifies the subgroup that typifies the great group. An example is Typic Haplorthods.

FAMILY. Families are established within a subgroup on the basis of physical and chemical properties and other characteristics that affect management. Generally, the properties are those of horizons below plow depth where there is much biological activity. Among the properties and characteristics considered are particle size, mineral content, soil temperature regime, soil depth, and reaction. A family name consists of the name of a subgroup preceded by terms that indicate soil properties. An example is sandy, mixed, frigid Typic Haplorthods.

SERIES. The series consists of soils within a family that have horizons similar in color, texture, structure, reaction, consistence, mineral and chemical composition, and arrangement in the profile.

References

- (1) American Association of State Highway and Transportation Officials. 1986. Standard specifications for highway materials and methods of sampling and testing. Ed. 14, 2 vols.
- (2) American Society for Testing and Materials. 1993. Standard classification of soils for engineering purposes. ASTM Stand. D 2487.
- (3) Berndt, Loren W. 1977. Soil survey of Delta County and Hiawatha National Forest of Alger and Schoolcraft Counties, Michigan. U.S. Dep. Agric., Soil Conserv. Serv. and For. Serv.
- (4) United States Department of Agriculture, Soil Conservation Service. National forestry manual. (Available in the State Office of the Natural Resources Conservation Service at East Lansing, Michigan)
- (5) United States Department of Agriculture, Soil Conservation Service. 1961. Land capability classification. U.S. Dep. Agric. Handb. 210.
- (6) United States Department of Agriculture, Soil Conservation Service. 1975. Soil taxonomy: A basic system of soil classification for making and interpreting soil surveys. U.S. Dep. Agric. Handb. 436.
- (7) United States Department of Agriculture, Soil Conservation Service. 1992. Keys to soil taxonomy. 5th ed. Soil Surv. Staff, Soil Manage. Support Serv. Tech. Monogr. 19.
- (8) United States Department of Agriculture, Soil Conservation Service. 1993. Soil survey manual. Soil Surv. Staff, U.S. Dep. Agric. Handb. 18.

Glossary

Alluvium. Material, such as sand, silt, or clay, deposited on land by streams.

Aquic conditions. Current soil wetness characterized by saturation, reduction, and redoximorphic features.

Area reclaim (in tables). An area difficult to reclaim after the removal of soil for construction and other uses. Revegetation and erosion control are extremely difficult.

Available water capacity (available moisture capacity). The capacity of soils to hold water available for use by most plants. It is commonly defined as the difference between the amount of soil water at field moisture capacity and the amount at wilting point. It is commonly expressed as inches of water per inch of soil. The capacity, in inches, in a 60-inch profile or to a limiting layer is expressed as:

Very low	0 to 3
Low	3 to 6
Moderate	6 to 9
High.....	9 to 12
Very high	more than 12

Base saturation. The degree to which material having cation-exchange properties is saturated with exchangeable bases (sum of Ca, Mg, Na, K), expressed as a percentage of the total cation-exchange capacity.

Bedrock. The solid rock that underlies the soil and other unconsolidated material or that is exposed at the surface.

Bedrock-controlled topography. A landscape where the configuration and relief of the landforms are determined or strongly influenced by the underlying bedrock.

Blowout. A shallow depression from which all or most of the soil material has been removed by the wind. A blowout has a flat or irregular floor formed by a resistant layer or by an accumulation of pebbles or cobbles. In some blowouts the water table is exposed.

Boulders. Rock fragments larger than 2 feet (60 centimeters) in diameter.

Clay. As a soil separate, the mineral soil particles less than 0.002 millimeter in diameter. As a soil textural class, soil material that is 40 percent or more clay, less than 45 percent sand, and less than 40 percent silt.

Clay film. A thin coating of oriented clay on the surface of a soil aggregate or lining pores or root channels. Synonyms: clay coating, clay skin.

Coarse textured soil. Sand or loamy sand.

Cobble (or cobblestone). A rounded or partly rounded fragment of rock 3 to 10 inches (7.6 to 25 centimeters) in diameter.

Cobbly soil material. Material that is 15 to 35 percent, by volume, rounded or partially rounded rock fragments 3 to 10 inches (7.6 to 25 centimeters) in diameter. Very cobbly soil material is 35 to 60 percent of these rock fragments, and extremely cobbly soil material is more than 60 percent.

Complex, soil. A map unit of two or more kinds of soil or miscellaneous areas in such an intricate pattern or so small in area that it is not practical to map them separately at the selected scale of mapping. The pattern and proportion of the soils or miscellaneous areas are somewhat similar in all areas.

Consistence, soil. Refers to the degree of cohesion and adhesion of soil material and its resistance to deformation when ruptured. Consistence includes resistance of soil material to rupture and to penetration; plasticity, toughness, and stickiness of puddled soil material; and the manner in which the soil material behaves when subject to compression. Terms describing consistence are defined in the "Soil Survey Manual."

Cover crop. A close-growing crop grown primarily to improve and protect the soil between periods of regular crop production, or a crop grown between trees and vines in orchards and vineyards.

Culmination of the mean annual increment (CMAI). The average annual increase per acre in the volume of a stand. Computed by dividing the total volume of the stand by its age. As the stand increases in age, the mean annual increment

continues to increase until mortality begins to reduce the rate of increase. The point where the stand reaches its maximum annual rate of growth is called the culmination of the mean annual increment.

Cutbanks cave (in tables). The walls of excavations tend to cave in or slough.

Dense layer (in tables). A very firm, massive layer that has a bulk density of more than 1.8 grams per cubic centimeter. Such a layer affects the ease of digging and can affect filling and compacting.

Depth to rock (in tables). Bedrock is too near the surface for the specified use.

Drainage class (natural). Refers to the frequency and duration of wet periods under conditions similar to those under which the soil formed. Alterations of the water regime by human activities, either through drainage or irrigation, are not a consideration unless they have significantly changed the morphology of the soil. Seven classes of natural soil drainage are recognized—*excessively drained, somewhat excessively drained, well drained, moderately well drained, somewhat poorly drained, poorly drained, and very poorly drained*. These classes are defined in the "Soil Survey Manual."

Drumlin. A low, smooth, elongated oval hill, mound, or ridge of compact glacial till. The longer axis is parallel to the path of the glacier and commonly has a blunt nose pointing in the direction from which the ice approached.

Excess fines (in tables). Excess silt and clay in the soil. The soil does not provide a source of gravel or sand for construction purposes.

Fast intake (in tables). The rapid movement of water into the soil.

Fibric soil material (peat). The least decomposed of all organic soil material. Peat contains a large amount of well preserved fiber that is readily identifiable according to botanical origin. Peat has the lowest bulk density and the highest water content at saturation of all organic soil material.

Fine textured soil. Sandy clay, silty clay, or clay.

Frost action (in tables). Freezing and thawing of soil moisture. Frost action can damage roads, buildings and other structures, and plant roots.

Genesis, soil. The mode of origin of the soil. Refers especially to the processes or soil-forming factors responsible for the formation of the solum, or true soil, from the unconsolidated parent material.

Glacial outwash. Gravel, sand, and silt, commonly stratified, deposited by glacial meltwater.

Glacial till. Unsorted, nonstratified glacial drift consisting of clay, silt, sand, and boulders

transported and deposited by glacial ice.

Glaciolacustrine deposits. Material moved by glaciers and subsequently sorted and deposited by streams flowing from the melting ice. The deposits are stratified and occur as kames, eskers, deltas, and outwash plains.

Glaciolacustrine deposits. Material ranging from fine clay to sand derived from glaciers and deposited in glacial lakes mainly by glacial meltwater. Many deposits are interbedded or laminated.

Green manure crop (agronomy). A soil-improving crop grown to be plowed under in an early stage of maturity or soon after maturity.

Hemic soil material (mucky peat). Organic soil material intermediate in degree of decomposition between the less decomposed fibric material and the more decomposed sapric material.

Horizon, soil. A layer of soil, approximately parallel to the surface, having distinct characteristics produced by soil-forming processes. In the identification of soil horizons, an uppercase letter represents the major horizons. Numbers or lowercase letters that follow represent subdivisions of the major horizons. An explanation of the subdivisions is given in the "Soil Survey Manual." The major horizons of mineral soil are as follows:

O horizon.—An organic layer of fresh and decaying plant residue.

A horizon.—The mineral horizon at or near the surface in which an accumulation of humified organic matter is mixed with the mineral material. Also, a plowed surface horizon, most of which was originally part of a B horizon.

E horizon.—The mineral horizon in which the main feature is loss of silicate clay, iron, aluminum, or some combination of these.

B horizon.—The mineral horizon below an A horizon. The B horizon is in part a layer of transition from the overlying A to the underlying C horizon. The B horizon also has distinctive characteristics, such as (1) accumulation of clay, sesquioxides, humus, or a combination of these; (2) prismatic or blocky structure; (3) redder or browner colors than those in the A horizon; or (4) a combination of these.

C horizon.—The mineral horizon or layer, excluding indurated bedrock, that is little affected by soil-forming processes and does not have the properties typical of the overlying soil material.

The material of a C horizon may be either like or unlike that in which the solum formed. If the material is known to differ from that in the solum, an Arabic numeral, commonly a 2, precedes the letter C.

Cr horizon.—Soft, consolidated bedrock beneath the soil.

R layer.—Consolidated bedrock beneath the soil. The bedrock commonly underlies a C horizon, but it can be directly below an A or a B horizon.

Kame. An irregular, short ridge or hill of stratified glacial drift.

Lacustrine deposit. Material deposited in lake water and exposed when the water level is lowered or the elevation of the land is raised.

Large stones (in tables). Rock fragments 3 inches (7.6 centimeters) or more across. Large stones adversely affect the specified use of the soil.

Leaching. The removal of soluble material from soil or other material by percolating water.

Loam. Soil material that is 7 to 27 percent clay particles, 28 to 50 percent silt particles, and less than 52 percent sand particles.

Low strength. The soil is not strong enough to support loads.

Medium textured soil. Very fine sandy loam, loam, silt loam, or silt.

Mineral soil. Soil that is mainly mineral material and low in organic material. Its bulk density is more than that of organic soil.

Miscellaneous area. An area that has little or no natural soil and supports little or no vegetation.

Moderately coarse textured soil. Coarse sandy loam, sandy loam, or fine sandy loam.

Moderately fine textured soil. Clay loam, sandy clay loam, or silty clay loam.

Moraine. An accumulation of earth, stones, and other debris deposited by a glacier. Some types are terminal, lateral, medial, and ground.

Morphology, soil. The physical makeup of the soil, including the texture, structure, porosity, consistence, color, and other physical, mineral, and biological properties of the various horizons, and the thickness and arrangement of those horizons in the soil profile.

Muck. Dark, finely divided, well decomposed organic soil material. (See Sapric soil material.)

Munsell notation. A designation of color by degrees of three simple variables—hue, value, and chroma. For example, a notation of 10YR 6/4 is a color with hue of 10YR, value of 6, and chroma of 4.

Organic matter. Plant and animal residue in the soil in various stages of decomposition. The content of organic matter in the surface layer is described as follows:

Very low	less than 0.5 percent
Low	0.5 to 1.0 percent
Moderately low	1.0 to 2.0 percent

Moderate	2.0 to 4.0 percent
High	4.0 to 8.0 percent
Very high	more than 8.0 percent

Outwash plain. A landform of mainly sandy or coarse textured material of glaciofluvial origin. An outwash plain is commonly smooth; where pitted, it generally is low in relief.

Peat. Unconsolidated material, largely undecomposed organic matter, that has accumulated under excess moisture. (See Fibric soil material.)

Ped. An individual natural soil aggregate, such as a granule, a prism, or a block.

Percs slowly (in tables). The slow movement of water through the soil adversely affects the specified use.

Permeability. The quality of the soil that enables water or air to move downward through the profile. The rate at which a saturated soil transmits water is accepted as a measure of this quality. In soil physics, the rate is referred to as "saturated hydraulic conductivity," which is defined in the "Soil Survey Manual." In line with conventional usage in the engineering profession and with traditional usage in published soil surveys, this rate of flow continues to be expressed as "permeability." Terms describing permeability, measured in inches per hour, are as follows:

Extremely slow	0.0 to 0.01 inch
Very slow	0.01 to 0.06 inch
Slow	0.06 to 0.2 inch
Moderately slow	0.2 to 0.6 inch
Moderate	0.6 inch to 2.0 inches
Moderately rapid	2.0 to 6.0 inches
Rapid	6.0 to 20 inches
Very rapid	more than 20 inches

Phase, soil. A subdivision of a soil series based on features that affect its use and management, such as slope, stoniness, and flooding.

pH value. A numerical designation of acidity and alkalinity in soil. (See Reaction, soil.)

Piping (in tables). Formation of subsurface tunnels or pipelike cavities by water moving through the soil.

Ponding. Standing water on soils in closed depressions. Unless the soils are artificially drained, the water can be removed only by percolation or evapotranspiration.

Poor filter (in tables). Because of rapid or very rapid permeability, the soil may not adequately filter effluent from a waste disposal system.

Profile, soil. A vertical section of the soil extending through all its horizons and into the parent material.

Reaction, soil. A measure of acidity or alkalinity of a soil, expressed in pH values. A soil that tests to pH 7.0 is described as precisely neutral in reaction

because it is neither acid nor alkaline. The degrees of acidity or alkalinity, expressed as pH values, are:

Extremely acid	below 4.4
Very strongly acid	4.5 to 5.0
Strongly acid	5.1 to 5.5
Medium acid	5.6 to 6.0
Slightly acid	6.1 to 6.5
Neutral	6.6 to 7.3
Mildly alkaline	7.4 to 7.8
Moderately alkaline	7.9 to 8.4
Strongly alkaline	8.5 to 9.0
Very strongly alkaline	9.1 and higher

Relief. The elevations or inequalities of a land surface, considered collectively.

Rooting depth (in tables). Shallow root zone. The soil is shallow over a layer that greatly restricts roots.

Sand. As a soil separate, individual rock or mineral fragments from 0.05 millimeter to 2.0 millimeters in diameter. Most sand grains consist of quartz. As a soil textural class, a soil that is 85 percent or more sand and not more than 10 percent clay.

Sapric soil material (muck). The most highly decomposed of all organic soil material. Muck has the least amount of plant fiber, the highest bulk density, and the lowest water content at saturation of all organic soil material.

Seepage (in tables). The movement of water through the soil. Seepage adversely affects the specified use.

Shrink-swell (in tables). The shrinking of soil when dry and the swelling when wet. Shrinking and swelling can damage roads, dams, building foundations, and other structures. It can also damage plant roots.

Silt. As a soil separate, individual mineral particles that range in diameter from the upper limit of clay (0.002 millimeter) to the lower limit of very fine sand (0.05 millimeter). As a soil textural class, soil that is 80 percent or more silt and less than 12 percent clay.

Slope. The inclination of the land surface from the horizontal. Percentage of slope is the vertical

distance divided by horizontal distance, then multiplied by 100. Thus, a slope of 20 percent is a drop of 20 feet in 100 feet of horizontal distance.

Slope (in tables). Slope is great enough that special practices are required to ensure satisfactory performance of the soil for a specific use.

Slow intake (in tables). The slow movement of water into the soil.

Slow refill (in tables). The slow filling of ponds, resulting from restricted permeability in the soil.

Small stones (in tables). Rock fragments less than 3 inches (7.6 centimeters) in diameter. Small stones adversely affect the specified use of the soil.

Structure, soil. The arrangement of primary soil particles into compound particles or aggregates. The principal forms of soil structure are—*platy* (laminated), *prismatic* (vertical axis of aggregates longer than horizontal), *columnar* (prisms with rounded tops), *blocky* (angular or subangular), and *granular*. *Structureless* soils are either *single grained* (each grain by itself, as in dune sand) or *massive* (the particles adhering without any regular cleavage, as in many hardpans).

Subsoil. Technically, the B horizon; roughly, the part of the solum below plow depth.

Surface soil. The A, E, AB, and EB horizons, considered collectively. It includes all subdivisions of these horizons.

Texture, soil. The relative proportions of sand, silt, and clay particles in a mass of soil. The basic textural classes, in order of increasing proportion of fine particles, are *sand*, *loamy sand*, *sandy loam*, *loam*, *silt loam*, *silt*, *sandy clay loam*, *clay loam*, *silty clay loam*, *sandy clay*, *silty clay*, and *clay*. The sand, loamy sand, and sandy loam classes may be further divided by specifying "coarse," "fine," or "very fine."

Thin layer (in tables). Otherwise suitable soil material that is too thin for the specified use.

Tilth, soil. The physical condition of the soil as related to tillage, seedbed preparation, seedling emergence, and root penetration.

Tables

TABLE 1.--ACREAGE AND PROPORTIONATE EXTENT OF THE SOILS

Map symbol	Soil name	School-			Total--	
		Alger	Delta	Craft	Area	Extent
		County	County	County	Acres	Pct
Ad	Alluvial land-----	594	8,207	1,484	10,285	0.9
AlC	Alpena gravelly sandy loam, 0 to 12 percent slopes-----	0	2,258	0	2,258	0.2
AuB	Au Gres sand, 0 to 6 percent slopes-----	2,598	15,954	5,877	24,429	2.1
AvA	Battlefield loamy sand, 0 to 4 percent slopes-----	9	1,049	0	1,058	0.1
B1B	Blue Lake sand, 0 to 6 percent slopes-----	4,442	1,346	158	5,946	0.5
B1D	Blue Lake sand, 6 to 18 percent slopes-----	8,186	245	990	9,421	0.8
B1E	Blue Lake sand, 18 to 40 percent slopes-----	2,579	28	0	2,607	0.2
BoB	Bohemian fine sandy loam, 0 to 6 percent slopes-----	90	869	62	1,021	0.1
BoD	Bohemian fine sandy loam, 6 to 18 percent slopes-----	880	209	9	1,098	0.1
Bp	Borrow pits-----	50	394	8	452	*
BrA	Bowers silt loam, 0 to 4 percent slopes-----	0	468	0	468	*
Bs	Bravort mucky loamy sand-----	58	2,443	288	2,789	0.2
BtA	Brimley fine sandy loam, 0 to 4 percent slopes-----	86	3,570	104	3,760	0.3
Bu	Bruce mucky fine sandy loam, coarse variant-----	49	3,026	1,048	4,123	0.4
BwC	Burt mucky sandy loam, 2 to 12 percent slopes-----	312	598	315	1,225	0.1
Cb	Carbondale, Lupton, and Rifle soils-----	14,106	62,258	11,938	88,302	7.8
Ch	Cathro muck-----	280	4,972	0	5,252	0.5
Ck	Cathro and Tacoosh mucks-----	1,349	38,207	0	39,556	3.5
ClA	Charlevoix sandy loam, 0 to 4 percent slopes-----	102	57,743	113	57,958	5.2
CmA	Chatham fine sandy loam, 0 to 2 percent slopes-----	223	0	0	223	*
CmB	Chatham fine sandy loam, 2 to 6 percent slopes-----	2,281	0	0	2,281	0.2
CmD	Chatham fine sandy loam, 6 to 18 percent slopes-----	538	0	0	538	*
Cn	Chippeny muck-----	3,095	5,404	30	8,529	0.7
CrA	Croswell sand, 0 to 4 percent slopes-----	0	15,947	0	15,947	1.5
Da	Dawson peat-----	0	466	0	466	*
Dd	Dawson and Greenwood peats-----	7,065	22,919	4,454	34,438	3.0
DeB	Deerton sand, 0 to 6 percent slopes-----	1,012	0	0	1,012	0.1
DeD	Deerton sand, 6 to 18 percent slopes-----	761	0	0	761	0.1
D1B	Deerton-Burt complex, 0 to 6 percent slopes-----	330	0	0	330	*
Dm	Deford loamy fine sand-----	0	701	27	728	0.1
DuB	Duel loamy sand, 0 to 6 percent slopes-----	61	2,798	0	2,859	0.3
EaB	Springlake sand, 0 to 6 percent slopes-----	30	549	579	1,158	0.1
EcB	Adams loamy sand, 0 to 6 percent slopes-----	898	27	0	925	0.1
EcD	Adams loamy sand, 6 to 18 percent slopes-----	569	0	0	569	*
EdB	Eastport sand, 0 to 6 percent slopes-----	0	2,826	0	2,826	0.2
EeB	Eastport-Roscommon sands, 0 to 6 percent slopes-----	265	3,470	0	3,735	0.3
EmA	Emmet sandy loam, 0 to 2 percent slopes-----	0	198	0	198	*
EmB	Emmet sandy loam, 2 to 6 percent slopes-----	198	3,330	0	3,528	0.3
EmC	Emmet sandy loam, 6 to 12 percent slopes-----	22	687	0	709	0.1
EnA	Ensign fine sandy loam, 0 to 3 percent slopes-----	544	4,806	0	5,350	0.5
Es	Ensley and Angelica soils-----	1,069	45,932	51	47,052	4.2
FaA	Fairport silt loam, 0 to 2 percent slopes-----	0	374	0	374	*
FaB	Fairport silt loam, 2 to 6 percent slopes-----	0	356	0	356	*
GcB	Gilchrist sand, 0 to 6 percent slopes-----	138	6	1,268	1,412	0.1
GrB	Grayling sand, 0 to 6 percent slopes-----	0	6,169	0	6,169	0.5
GrD	Grayling sand, 6 to 18 percent slopes-----	0	355	0	355	*
Gw	Greenwood peat-----	10	3,398	34	3,442	0.3
IoB	Iosco sand, 0 to 6 percent slopes-----	71	3,600	97	3,768	0.3
KaB	Kalkaska sand, 0 to 6 percent slopes-----	45,526	45,428	27,885	118,839	10.5
KaD	Kalkaska sand, 6 to 18 percent slopes-----	24,461	28,828	16,256	69,545	6.2
KaE	Kalkaska sand, 18 to 40 percent slopes-----	6,161	347	2,659	9,167	0.8
KdB	Karin sandy loam, 0 to 6 percent slopes-----	1,774	8,703	3,210	13,687	1.2
KdD	Karin sandy loam, 6 to 18 percent slopes-----	443	4,632	1,924	6,999	0.6
KgC	Kawbawgam sandy loam, 0 to 10 percent slopes-----	942	0	305	1,247	0.1
K1A	Kawkawlin silt loam, 0 to 2 percent slopes-----	5	417	0	422	*
KnB	Keweenaw loamy sand, 0 to 6 percent slopes-----	1,427	0	122	1,549	0.1
KnD	Keweenaw loamy sand, 6 to 18 percent slopes-----	1,024	0	0	1,024	0.1
Kr	Kinross mucky sand-----	3,019	4,527	4,169	11,715	1.0
KsB	Kiva sandy loam, 0 to 6 percent slopes-----	671	9,044	96	9,811	0.9
KsD	Kiva sandy loam, 6 to 20 percent slopes-----	58	761	83	902	0.1
Lb	Lake beaches-----	153	0	0	153	*

See footnote at end of table.

TABLE 1.--ACREAGE AND PROPORTIONATE EXTENT OF THE SOILS--Continued

Map symbol	Soil name	School-craft			Total--	
		Alger County	Delta County	County	Area	Extent
		Acres	Acres	Acres	Acres	Pct
Lm	Limestone rock land-----	28	15,610	397	16,035	1.4
LoA	Longrie sandy loam, 0 to 2 percent slopes-----	83	2,013	0	2,096	0.2
LoB	Longrie sandy loam, 2 to 6 percent slopes-----	869	14,250	1,023	16,142	1.4
LsD	Longrie and Summerville sandy loams, 6 to 18 percent slopes-----	93	1,249	0	1,342	0.1
Ma	Made land-----	136	1,252	39	1,427	0.1
McB	Mancelona loamy sand, 0 to 6 percent slopes-----	0	249	196	445	*
McD	Mancelona loamy sand, 6 to 18 percent slopes-----	0	109	95	204	*
Mh	Marsh-----	80	880	36	996	0.1
M1B	Melita sand, 0 to 6 percent slopes-----	0	569	87	656	0.1
MnB	Menominee loamy sand, 0 to 6 percent slopes-----	23	2,533	1,149	3,705	0.3
MnD	Menominee loamy sand, 6 to 18 percent slopes-----	0	167	254	421	*
MuB	Munising sandy loam, 0 to 6 percent slopes-----	14,305	0	0	14,305	1.4
MuD	Munising sandy loam, 6 to 18 percent slopes-----	5,282	0	0	5,282	0.5
MuE	Munising sandy loam, 18 to 40 percent slopes-----	1,225	0	0	1,225	0.1
Nh	Nahma muck-----	512	17,351	6	17,869	1.7
NsA	Nester silt loam, 0 to 2 percent slopes-----	0	217	0	217	*
NsB	Nester silt loam, 2 to 6 percent slopes-----	0	663	0	663	0.1
OnA	Onaway fine sandy loam, 0 to 2 percent slopes-----	0	470	0	470	*
OnB	Onaway fine sandy loam, 2 to 6 percent slopes-----	39	27,238	267	27,544	2.4
OnC	Onaway fine sandy loam, 6 to 12 percent slopes-----	0	5,894	87	5,981	0.5
OnD	Onaway fine sandy loam, 12 to 18 percent slopes-----	0	429	0	429	*
OoE	Onota-Chippeny complex, steep-----	733	6	0	739	0.1
OrB	Onota-Deerton complex, 0 to 6 percent slopes-----	2,322	0	0	2,322	0.2
OrD	Onota-Deerton complex, 6 to 18 percent slopes-----	1,272	0	0	1,272	0.1
OtB	Otisco loamy sand, 0 to 6 percent slopes-----	55	2,324	0	2,379	0.2
Pc	Pickford silt loam-----	0	734	0	734	0.1
PfA	Algonquin silt loam, 0 to 4 percent slopes-----	0	773	0	773	0.1
PkA	Algonquin-Pickford complex, 0 to 4 percent slopes-----	0	1,132	0	1,132	0.1
Rc	Roscommon mucky sand-----	3,943	32,455	7,590	43,988	3.9
RkB	Roscommon-Kalkaska sands, 0 to 6 percent slopes-----	322	2,960	348	3,630	0.3
RoB	Rousseau fine sand, 0 to 6 percent slopes-----	21	1,147	122	1,290	0.1
RoD	Rousseau fine sand, 6 to 18 percent slopes-----	80	130	78	288	*
RsD	Rousseau fine sand, hilly-----	38	11,938	711	12,687	1.1
RuB	Rubicon sand, 0 to 6 percent slopes-----	14,845	32,679	24,452	71,976	6.3
RuD	Rubicon sand, 6 to 18 percent slopes-----	4,969	14,808	9,635	29,412	2.7
RuE	Rubicon sand, 18 to 40 percent slopes-----	254	262	0	516	*
Rv	Ruse silt loam-----	567	3,545	0	4,112	0.4
ScA	Finch sand, 0 to 3 percent slopes-----	0	628	171	799	0.1
ShB	Shelldrake sand, 0 to 8 percent slopes-----	1,074	0	0	1,074	0.1
SkB	Skaneet sandy loam, 0 to 6 percent slopes-----	701	0	0	701	0.1
StB	Steuben fine sandy loam, 0 to 6 percent slopes-----	3,571	0	1,040	4,611	0.4
StD	Steuben fine sandy loam, 6 to 18 percent slopes-----	4,249	0	0	4,249	0.4
SuA	Summerville fine sandy loam, 0 to 4 percent slopes-----	258	16,974	419	17,651	1.6
SvA	Sundell fine sandy loam, 0 to 4 percent slopes-----	754	13,141	0	13,895	1.2
SwA	Sundell loamy fine sand, sandy variant, 0 to 4 percent slopes-----	115	753	0	868	0.1
Ta	Tawas muck-----	9,612	54,905	21,716	86,233	7.6
TrA	Trenary fine sandy loam, 0 to 2 percent slopes-----	102	302	0	404	*
TrB	Trenary fine sandy loam, 2 to 6 percent slopes-----	2,266	31,936	3,309	37,511	3.3
TrC	Trenary fine sandy loam, 6 to 12 percent slopes-----	214	1,565	0	1,779	0.2
TrD	Trenary fine sandy loam, 12 to 18 percent slopes-----	245	2,623	119	2,987	0.3
WaA	Wainola fine sand, 0 to 4 percent slopes-----	9	1,712	221	1,942	0.2
W1B	Wallace sand, 0 to 6 percent slopes-----	32	614	61	707	0.1
W1D	Wallace sand, 6 to 18 percent slopes-----	115	1,417	58	1,590	0.1
Wm	Wheatley mucky loamy sand-----	20	539	0	559	*
YaB	Yalmer sand, 0 to 6 percent slopes-----	491	1,076	0	1,567	0.1
YaD	Yalmer sand, 6 to 18 percent slopes-----	208	130	0	338	*
	Total-----	216,746	755,200	159,329	1,131,275	100.0

* Less than 0.05 percent. The combined extent of the soils assigned an asterisk in the "Percent" column is about 0.4 percent of the survey area.

TABLE 2.--LAND CAPABILITY AND YIELDS PER ACRE OF CROPS

(Yields are those that can be expected under a high level of management. Absence of a yield indicates that the soil is not suited to the crop or the crop generally is not grown on the soil)

Soil name and map symbol	Land capability	Alfalfa hay	Corn	Corn silage	Oats	Irish potatoes	Other dry beans
		Tons	Bu	Tons	Bu	Cwt	Bu
Ad*----- Alluvial land	Vw	---	---	---	---	---	---
AlC----- Alpena	VI _s	---	---	---	---	---	---
AuB----- Au Gres	IVw	---	52	7.0	32	---	---
AvA----- Battlefield	IVw	3.6	63	8.4	35	---	---
B1B----- Blue Lake	III _s	3.9	63	8.4	42	194	---
B1D----- Blue Lake	IVe	---	---	---	---	---	---
B1E----- Blue Lake	VII _e	---	---	---	---	---	---
BoB----- Bohemian	II _e	4.5	79	10.5	56	258	---
BoD----- Bohemian	IVe	4.1	68	9.1	45	172	---
Bp*----- Borrow pits							
BrA----- Bowers	IIw	4.5	79	10.5	53	---	---
Bs----- Brevort	Vw	---	---	---	---	---	---
BtA----- Brimley	II _e	4.4	79	10.5	56	280	---
Bu----- Bruce variant	Vw	---	---	---	53	---	---
BwC----- Burt	VIIw	---	---	---	---	---	---
Cb----- Carbondale, Lupton, and Rifle	VIw	---	---	---	---	---	---
Ch----- Cathro	VIw	---	---	---	---	---	---
Ck----- Cathro and Tacoosh	VIw	---	---	---	---	---	---

See footnote at end of table.

TABLE 2.--LAND CAPABILITY AND YIELDS PER ACRE OF CROPS--Continued

Soil name and map symbol	Land capability	Alfalfa hay	Corn	Corn silage	Oats	Irish potatoes	Other dry beans
		Tons	Bu	Tons	Bu	Cwt	Bu
C1A----- Charlevoix	IIe	4.5	79	10.5	56	280	28
CmA----- Chatham	IIIs	4.4	73	9.8	53	248	---
CmB----- Chatham	IIe	4.4	73	9.3	53	248	---
CmD----- Chatham	IVe	4.1	---	4.5	---	---	---
Cn----- Chippeny	VIIw	---	---	---	---	---	---
CrA----- Croswell	IVs	3.2	52	7.0	32	---	---
Da----- Dawson	VIIw	---	---	---	---	---	---
Dd----- Dawson and Greenwood	VIIw	---	---	---	---	---	---
DeB----- Deerton	IVs	---	---	---	---	---	---
DeD----- Deerton	VIa	---	---	---	---	---	---
DlB----- Deerton-Burt	IVs	---	---	---	---	---	---
Dm----- Deford	Vw	---	---	---	---	---	---
DuB----- Duel	IVs	2.8	52	7.0	32	162	---
EaB----- Springlake	IVs	2.6	57	7.7	32	162	---
EcB----- Adams	IIIIs	---	---	---	---	---	---
EcD----- Adams	IVe	---	---	---	---	---	---
EdB----- Eastport	VIa	---	---	---	---	---	---
EeB----- Eastport- Roscommon	VIa	---	---	---	---	---	---
EmA----- Emmet	IIIs	4.4	79	10.5	56	280	---
EmB----- Emmet	IIe	4.5	79	10.5	56	258	---

See footnote at end of table.

TABLE 2.--LAND CAPABILITY AND YIELDS PER ACRE OF CROPS--Continued

Soil name and map symbol	Land capability	Alfalfa hay	Corn	Corn silage	Oats	Irish potatoes	Other dry beans
		Tons	Bu	Tons	Bu	Cwt	Bu
EmC----- Emmet	IIIe	4.1	73	9.8	45	215	---
EnA----- Ensign	IIIw	---	---	---	---	---	---
Es----- Ensley and Angelica	Vw	---	---	---	---	---	---
FaA, FaB----- Fairport	IIIe	4.5	84	11.2	60	---	11
GcB----- Gilchrist	IIIs	3.6	63	8.4	42	194	---
GrB----- Grayling	VI _s	---	---	---	---	---	---
GrD----- Grayling	VII _s	---	---	---	---	---	---
Gw----- Greenwood	VIIw	---	---	---	---	---	---
IoB----- Iosco	IIIw	3.4	57	7.7	32	---	---
KaB----- Kalkaska	IV _s	2.6	52	7.0	32	162	---
KaD----- Kalkaska	VI _s	---	---	---	---	---	---
KaE----- Kalkaska	VII _s	---	---	---	---	---	---
KdB----- Karlin	IIIs	4.1	63	8.4	45	215	8
KdD----- Karlin	IV _e	3.2	42	5.6	28	---	---
KgC----- Kawbawgam	IIIw	---	---	---	42	---	---
KlA----- Kawkawlin	IIw	4.9	94	12.6	60	---	---
KnB----- Keweenaw	IIIe	3.2	63	8.4	42	215	---
KnD----- Keweenaw	IV _e	2.4	---	---	---	---	---
Kr----- Kinross	VIw	---	---	---	---	---	---
KsB----- Kiva	IIIs	3.6	63	8.4	42	194	---

See footnote at end of table.

TABLE 2.--LAND CAPABILITY AND YIELDS PER ACRE OF CROPS--Continued

Soil name and map symbol	Land capability	Alfalfa hay	Corn	Corn silage	Oats	Irish potatoes	Other dry beans
		Tons	Bu	Tons	Bu	Cwt	Bu
KsD----- Kiva	IVe	3.4	42	5.6	32	---	---
Lb*. Lake beaches							
Lm*. Limestone rock land							
LoA, LoB----- Longrie	IIIs	4.5	84	11.2	56	237	10
LsD----- Longrie and Summerville	IVe	---	---	---	---	---	---
Ma*. Made land							
McB----- Mancelona	IIIs	3.9	63	8.4	39	183	---
McD----- Mancelona	IVe	---	---	---	---	---	---
Mh*. Marsh							
MlB----- Melita	IVs	2.6	52	7.0	32	172	---
MnB----- Menominee	IIIs	3.9	63	8.4	39	183	---
MnD----- Menominee	IVe	3.2	42	5.6	28	---	---
MuB----- Munising	IIe	3.9	79	10.5	53	250	---
MuD----- Munising	IIIe	3.6	73	9.8	45	215	---
MuE----- Munising	VIIe	---	---	---	53	---	---
Nh----- Nahma	Vw	---	---	---	---	---	---
NsA, NsB----- Nester	IIe	4.9	94	12.6	60	---	11
OnA----- Onaway	IIIs	4.5	90	12.0	60	300	11
OnB----- Onaway	IIe	4.5	90	12.0	60	300	11

See footnote at end of table.

TABLE 2.--LAND CAPABILITY AND YIELDS PER ACRE OF CROPS--Continued

Soil name and map symbol	Land capability	Alfalfa hay	Corn	Corn silage	Oats	Irish potatoes	Other dry beans
		Tons	Bu	Tons	Bu	Cwt	Bu
OnC----- Onaway	IIIe	4.5	79	10.5	56	215	---
OnD----- Onaway	IVe	3.9	---	---	45	---	---
OoE----- Onota-Chippeny	VIIe	---	---	---	---	---	---
OrB----- Onota-Deerton	IIIe	---	---	---	---	---	---
OrD----- Onota-Deerton	VIa	---	---	---	---	---	---
OtB----- Otisco	IIIw	3.6	73	9.8	42	183	---
Pc----- Pickford	IIIw	---	73	9.8	49	---	---
PfA----- Algonquin	IIIw	4.1	73	9.8	53	---	---
PkA----- Algonquin- Pickford	IIIw	---	73	9.8	49	---	---
Rc----- Roscommon	VIw	---	---	---	---	---	---
RkB----- Roscommon- Kalkaska	VIw	---	---	---	---	---	---
RoB----- Rousseau	IIIs	3.6	63	8.4	42	183	---
RoD----- Rousseau	IVe	3.2	52	7.0	32	---	---
RsD----- Rousseau	VIa	---	---	---	---	---	---
RuB----- Rubicon	VIa	---	---	---	---	---	---
RuD, RuE----- Rubicon	VIIa	---	---	---	---	---	---
Rv----- Ruse	VIIw	---	---	---	---	---	---
ScA----- Finch	IVw	---	---	---	---	---	---
ShB----- Sheldrake	VIa	---	---	---	---	---	---
SkB----- Skanee	IIw	3.9	79	10.5	53	250	---

See footnote at end of table.

TABLE 2.--LAND CAPABILITY AND YIELDS PER ACRE OF CROPS--Continued

Soil name and map symbol	Land capability	Alfalfa hay	Corn	Corn silage	Oats	Irish potatoes	Other dry beans
		Tons	Bu	Tons	Bu	Cwt	Bu
StB----- Steuben	IIe	3.0	73	9.8	49	237	---
StD----- Steuben	IVe	---	---	---	---	---	---
SuA----- Summerville	IIIs	---	---	---	---	---	---
SwA----- Sundell	IIIw	3.4	84	11.2	56	---	---
SwA----- Sundell variant	IVw	2.1	52	7.0	32	---	---
Ta----- Tawas	VIw	---	---	---	---	---	---
TrA----- Trenary	IIC	4.5	94	12.6	60	300	---
TrB----- Trenary	IIe	4.5	90	12.0	60	300	---
TrC----- Trenary	IIIe	4.1	79	10.5	56	215	---
TrD----- Trenary	IVe	3.9	---	---	45	---	---
WaA----- Wainola	IIIw	---	63	8.4	42	183	---
WlB----- Wallace	VIIs	---	---	---	---	---	---
WlD----- Wallace	VIIIs	---	---	---	---	---	---
Wm----- Wheatley	Vw	---	---	---	---	---	---
YaB----- Yalmer	IIIs	---	---	---	---	---	---
YaD----- Yalmer	IIIe	---	---	---	---	---	---

* See description of the map unit for composition and behavior characteristics of the map unit.

TABLE 3.--PRIME FARMLAND

(Only the soils considered prime farmland are listed. Urban or built-up areas of the soils listed are not considered prime farmland. If a soil is prime farmland only under certain conditions, the conditions are specified in parentheses after the soil name)

Map symbol	Soil name
BoB	Bohemian fine sandy loam, 0 to 6 percent slopes
BrA	Bowers silt loam, 0 to 4 percent slopes (where drained)
BtA	Brimley fine sandy loam, 0 to 4 percent slopes (where drained)
ClA	Charlevoix sandy loam, 0 to 4 percent slopes (where drained)
CmA	Chatham fine sandy loam, 0 to 2 percent slopes
CmB	Chatham fine sandy loam, 2 to 6 percent slopes
EmA	Emmet sandy loam, 0 to 2 percent slopes
EmB	Emmet sandy loam, 2 to 6 percent slopes
Es	Ensley and Angelica soils (where drained)
KlA	Kawkawlin silt loam, 0 to 2 percent slopes (where drained)
NsA	Nester silt loam, 0 to 2 percent slopes
NsB	Nester silt loam, 2 to 6 percent slopes
OnA	Onaway fine sandy loam, 0 to 2 percent slopes
OnB	Onaway fine sandy loam, 2 to 6 percent slopes
TrA	Trenary fine sandy loam, 0 to 2 percent slopes
TrB	Trenary fine sandy loam, 2 to 6 percent slopes

TABLE 4.--WOODLAND MANAGEMENT AND PRODUCTIVITY

(Only the soils suitable for production of commercial trees are listed. Absence of an entry indicates that information was not available)

Soil name and map symbol	Ordi- nation symbol	Erosion hazard	Management concerns			Potential productivity			
			Equip- ment limita- tion	Seedling mortal- ity	Wind- throw hazard	Common trees	Site index	Volume* 	Trees to plant
AlC----- Alpena	3F	Slight	Slight	Moderate	Slight	Sugar maple----- Balsam fir----- Quaking aspen----- Paper birch----- White spruce----- Northern whitecedar----- Yellow birch-----	61	38	Red pine, jack pine.
AuB----- Au Gres	6W	Slight	Severe	Moderate	Severe	Quaking aspen----- Bigtooth aspen----- Balsam fir----- Paper birch----- Yellow birch----- Red maple----- Eastern hemlock----- Eastern white pine----- Northern whitecedar----- Jack pine----- Red pine-----	70	81	White spruce, red pine, eastern white pine, Norway spruce.
AvA----- Battlefield	5W	Slight	Severe	Moderate	Severe	Quaking aspen----- Red maple----- Balsam fir----- Paper birch----- Sugar maple-----	68	78	White spruce.
BlB, BlD----- Blue Lake	3S	Slight	Moderate	Moderate	Slight	Sugar maple----- Yellow birch----- Quaking aspen----- Eastern white pine----- Eastern hemlock----- American beech----- American basswood----- Bigtooth aspen----- Red maple-----	64	40	Red pine, eastern white pine, jack pine.
BlE----- Blue Lake	3R	Moderate	Moderate	Moderate	Slight	Sugar maple----- Yellow birch----- Quaking aspen----- Eastern white pine----- Eastern hemlock----- American beech----- American basswood----- Bigtooth aspen----- Red maple-----	64	40	Red pine, eastern white pine, jack pine.
BoB, BoD----- Bohemian	3L	Slight	Moderate	Slight	Slight	Sugar maple----- Red maple----- Yellow birch----- American beech----- American basswood----- Eastern white pine----- Eastern hemlock----- Paper birch----- Balsam fir-----	67	41	Red pine, white spruce, eastern white pine, white ash.

See footnotes at end of table.

TABLE 4.--WOODLAND MANAGEMENT AND PRODUCTIVITY--Continued

Soil name and map symbol	Ordi- nation symbol	Erosion hazard	Management concerns			Potential productivity			
			Equip- ment limita- tion	Seedling mortal- ity	Wind- throw hazard	Common trees	Site index	Volume*	Trees to plant
BrA----- Bowers	7W	Slight	Severe	Slight	Moderate	Balsam fir----- American basswood--- White ash----- Yellow birch----- Northern red oak--- Quaking aspen-----	54	105	White spruce, eastern white pine, Norway spruce.
Es----- Brevort	2W	Slight	Severe	Severe	Severe	Quaking aspen----- Balsam fir----- Northern whitecedar--- Red maple----- Black spruce-----	40	22	Eastern white pine, northern whitecedar.
BtA----- Brimley	3W	Slight	Severe	Slight	Moderate	Sugar maple----- Northern red oak--- Black ash----- Yellow birch----- Eastern white pine--- Red maple----- Balsam fir----- Northern whitecedar--- Eastern hemlock-----	60	38	White spruce, eastern white pine, northern whitecedar.
Bu----- Bruce variant	6W	Slight	Severe	Severe	Severe	Balsam fir----- Quaking aspen----- Red maple----- Northern whitecedar--- Yellow birch-----	45	83	
BwC----- Burt	2W	Slight	Severe	Severe	Severe	Quaking aspen----- Red maple----- Northern whitecedar--- Black spruce----- Eastern hemlock----- Balsam fir-----	45	32	
Cb**: Carbondale---	5W	Slight	Severe	Severe	Severe	Balsam fir----- Black spruce----- Northern whitecedar--- Tamarack----- Paper birch-----	40	71	
Lupton-----	2W	Slight	Severe	Severe	Severe	Black spruce----- Balsam fir----- Black ash----- Northern whitecedar--- Paper birch----- Tamarack----- Red maple----- Quaking aspen----- White spruce-----	20	29	
Rifle-----	5W	Slight	Severe	Severe	Severe	Balsam fir----- Northern whitecedar--- Black ash----- Tamarack----- American basswood--- Paper birch----- Black spruce-----	40	71	

See footnotes at end of table.

TABLE 4.--WOODLAND MANAGEMENT AND PRODUCTIVITY--Continued

Soil name and map symbol	Ordi- nation symbol	Erosion hazard	Management concerns				Potential productivity			Trees to plant
			Equip- ment limita- tion	Seedling mortal- ity	Wind- throw hazard	Common trees	Site index	Volume*		
Ch----- Cathro	5W	Slight	Severe	Severe	Severe	Balsam fir----- Northern whitecedar----- Tamarack----- Paper birch----- Red maple----- Black spruce----- White spruce-----	40 15 35 --- 40 15 ---	71 23 23 --- 26 23 ---	White spruce.	
Ck**: Cathro-----	5W	Slight	Severe	Severe	Severe	Balsam fir----- Northern whitecedar----- Tamarack----- Paper birch----- Red maple----- Black spruce----- White spruce-----	40 15 35 --- 40 15 ---	71 23 23 --- 28 23 ---	White spruce.	
Tacoosh-----	5W	Slight	Severe	Severe	Severe	Balsam fir----- White spruce----- Black ash----- Black spruce----- Red maple----- Tamarack----- Quaking aspen----- Northern whitecedar-----	40 40 --- --- --- --- --- ---	71 72 --- --- --- --- --- ---	Black spruce, tamarack, northern whitecedar.	
ClA----- Charlevoix	3W	Slight	Severe	Slight	Moderate	Red maple----- Paper birch----- Balsam fir----- White spruce----- Northern whitecedar----- Eastern hemlock----- Quaking aspen----- Black ash-----	65 --- --- --- --- --- --- ---	40 --- --- --- --- --- --- ---	White spruce, eastern white pine, Norway spruce, northern whitecedar.	
CmA, CmB, CmD--- Chatham	3L	Slight	Moderate	Slight	Slight	Sugar maple----- Yellow birch----- Eastern white pine-----	61 --- ---	38 --- ---	Red pine, eastern white pine, jack pine.	
Cn----- Chippeny	4W	Slight	Severe	Severe	Severe	Balsam fir----- Black ash----- Paper birch----- Northern whitecedar----- Yellow birch----- Red maple----- Black spruce----- Eastern hemlock----- Quaking aspen-----	35 --- --- 35 --- --- --- --- ---	60 --- --- 51 --- --- --- --- ---		
CrA----- Croswell	5S	Slight	Moderate	Moderate	Moderate	Quaking aspen----- Red pine----- Jack pine----- Northern red oak----- Black cherry----- Eastern white pine----- Bigtooth aspen----- Red maple----- Paper birch-----	68 55 53 --- --- --- 69 --- 54	78 88 73 --- --- --- 80 --- 55	Red pine, eastern white pine, white spruce.	

See footnotes at end of table.

TABLE 4.--WOODLAND MANAGEMENT AND PRODUCTIVITY--Continued

Soil name and map symbol	Ordi-nation symbol	Erosion hazard	Management concerns			Potential productivity			Trees to plant
			Equip-ment limitation	Seedling mortality	Wind-throw hazard	Common trees	Site index	Volume*	
Da-----	2W	Slight	Severe	Severe	Severe	Black spruce----- Tamarack-----	15	23	
Dawson									
Dd**:									
Dawson-----	2W	Slight	Severe	Severe	Severe	Black spruce----- Tamarack-----	15	23	
Greenwood-----	2W	Slight	Severe	Severe	Severe	Black spruce----- Balsam fir----- Tamarack-----	15	23	
							39	69	
DeB, DeD-----	3D	Slight	Slight	Moderate	Moderate	Sugar maple----- Quaking aspen----- American basswood--- Balsam fir----- Paper birch----- Red maple----- Yellow birch----- Bigtooth aspen----- Eastern hemlock-----	60	38	Red pine, jack pine.
Deerton									
DLB**:									
Deerton-----	3D	Slight	Slight	Moderate	Moderate	Sugar maple----- Quaking aspen----- American basswood--- Balsam fir----- Paper birch----- Red maple----- Yellow birch----- Bigtooth aspen----- Eastern hemlock-----	60	38	Red pine, jack pine.
Burt-----	2W	Slight	Severe	Severe	Severe	Quaking aspen----- Red maple----- Northern whitecedar--- Black spruce----- Eastern hemlock----- Balsam fir-----	45	32	
Dm-----	4W	Slight	Severe	Severe	Severe	Quaking aspen----- Balsam fir----- Northern whitecedar--- American basswood--- Red maple-----	60	64	Eastern white pine, white spruce.
Deford									
DuB-----	2D	Slight	Slight	Slight	Slight	Sugar maple----- Quaking aspen----- Balsam fir----- Paper birch----- Red maple-----	53	34	Red pine, eastern white pine, jack pine.
Duel									
EaB-----	3S	Slight	Moderate	Moderate	Slight	Sugar maple----- Quaking aspen----- Red pine----- Paper birch-----	60	38	Red pine, jack pine, eastern white pine.
Springlake							62	107	

See footnotes at end of table.

TABLE 4.--WOODLAND MANAGEMENT AND PRODUCTIVITY--Continued

Soil name and map symbol	Ordi- nation symbol	Management concerns				Potential productivity			
		Erosion hazard	Equip- ment limita- tion	Seedling mortal- ity	Wind- throw hazard	Common trees	Site index	Volume*	Trees to plant
EcB, EcD----- Adams	3S	Slight	Slight	Severe	Slight	Sugar maple----- Red maple----- American beech----- Eastern hemlock----- Eastern white pine--	61	38	Eastern white pine, red pine, European larch.
EdB----- Eastport	5S	Slight	Moderate	Moderate	Slight	Red pine----- Jack pine----- Quaking aspen----- Eastern white pine-- Paper birch----- Red maple-----	47	69	Red pine, jack pine, eastern white pine.
EeB**: Eastport-----	5S	Slight	Moderate	Moderate	Slight	Red pine----- Jack pine----- Quaking aspen----- Eastern white pine-- Paper birch----- Red maple-----	47	69	Red pine, jack pine, eastern white pine.
Roscommon-----	6W	Slight	Severe	Severe	Severe	Quaking aspen----- Black spruce----- Northern whitecedar----- Jack pine----- Balsam fir----- Red maple-----	74	86	Black spruce, northern whitecedar, tamarack.
EmA, EmB, EmC--- Emmet	3L	Slight	Moderate	Slight	Slight	Sugar maple----- Quaking aspen----- Yellow birch----- Red pine----- American basswood--- American beech----- Eastern white pine-- Northern red oak--- Eastern hemlock----- Bigtooth aspen-----	66	41	White spruce, red pine, eastern white pine.
EnA----- Ensign	3W	Slight	Severe	Moderate	Severe	Northern whitecedar----- Quaking aspen----- Bigtooth aspen----- Balsam fir----- Red pine----- Paper birch-----	34	49	Northern whitecedar, eastern white pine.
Es**: Ensley-----	3W	Slight	Severe	Severe	Severe	Red maple----- Balsam fir----- White spruce----- Black ash-----	62	39	Green ash, white spruce.
Angelica-----	7W	Slight	Severe	Severe	Severe	Balsam fir----- Quaking aspen----- Paper birch----- Northern whitecedar----- Black ash-----	54	105	White spruce.

See footnotes at end of table.

TABLE 4.--WOODLAND MANAGEMENT AND PRODUCTIVITY--Continued

Soil name and map symbol	Ordi- nation symbol	Erosion hazard	Management concerns			Potential productivity			
			Equip- ment limita- tion	Seedling mortal- ity	Wind- throw hazard	Common trees	Site index	Volume* 	
FaA, FaB----- Fairport	3D	Slight	Moderate	Moderate	Moderate	Sugar maple----- American beech----- Northern whitecedar-----	65	40	White spruce, eastern white pine, Norway spruce.
GcB----- Gilchrist	3S	Slight	Moderate	Moderate	Slight	Sugar maple----- American basswood--- Yellow birch-----	65	40	Red pine, Norway spruce, eastern white pine, jack pine.
GrB, GrD----- Grayling	4S	Slight	Moderate	Moderate	Slight	Jack pine----- Northern pin oak--- Red pine----- Quaking aspen-----	48	63	Jack pine, red pine.
Gw----- Greenwood	2W	Slight	Severe	Severe	Severe	Black spruce----- Balsam fir----- Tamarack-----	15	23	
IoB----- Iosco	5W	Slight	Severe	Moderate	Severe	Quaking aspen----- White ash----- Red maple----- Yellow birch----- Northern pin oak----- Eastern white pine----- Balsam fir----- Paper birch----- White spruce-----	65	73	Eastern white pine, white spruce.
KaB, KaD----- Kalkaska	3S	Slight	Moderate	Moderate	Slight	Sugar maple----- Quaking aspen----- Red pine----- Eastern white pine----- American beech----- Paper birch----- Northern red oak----- Red maple----- Bigtooth aspen-----	64	40	Red pine, eastern white pine.
KaE----- Kalkaska	3R	Moderate	Moderate	Moderate	Slight	Sugar maple----- Quaking aspen----- Red pine----- Eastern white pine----- American beech----- Paper birch----- Northern red oak----- Red maple----- Bigtooth aspen-----	64	40	Red pine, eastern white pine.
KdB, KdD----- Karlin	3A	Slight	Slight	Slight	Slight	Sugar maple----- Yellow birch----- Bigtooth aspen----- Northern red oak----- American basswood----- Red pine----- Eastern white pine-----	61	38	Red pine, eastern white pine.
							65	115	
							---	---	

See footnotes at end of table.

TABLE 4.--WOODLAND MANAGEMENT AND PRODUCTIVITY--Continued

Soil name and map symbol	Ordi- nation symbol	Erosion hazard	Management concerns			Potential productivity			
			Equip- ment limita- tion	Seedling mortal- ity	Wind- throw hazard	Common trees	Site index	Volume*	Trees to plant
KgC----- Kawbawgam	2W	Slight	Severe	Moderate	Severe	Red maple----- Yellow birch----- Balsam fir----- Quaking aspen-----	55 --- --- ---	35 --- --- ---	White spruce, eastern white pine, northern whitecedar.
KlA----- Kawkawlin	3W	Slight	Severe	Slight	Moderate	Sugar maple----- Northern red oak----- Red maple----- White ash----- American basswood--- Quaking aspen----- Bigtooth aspen-----	60 --- --- --- --- --- ---	38 --- --- --- --- --- ---	White spruce, red pine, Norway spruce, eastern white pine.
KnB, KnD----- Keweenaw	3A	Slight	Slight	Slight	Slight	Sugar maple----- Eastern hemlock----- Yellow birch----- Northern red oak----- Paper birch----- Red maple----- Black cherry----- Eastern white pine--- Balsam fir----- Quaking aspen----- Red pine----- Bigtooth aspen-----	61 --- --- 64 60 50 --- --- --- 60 74	38 --- --- 57 65 32 --- --- --- 101 86	Eastern white pine, red pine.
Kr----- Kinross	2W	Slight	Severe	Severe	Severe	Quaking aspen----- Black spruce----- Tamarack----- Northern whitecedar----- Balsam fir----- Red maple----- Jack pine----- Eastern white pine--- Paper birch-----	45 --- --- --- --- --- --- --- ---	32 --- --- --- --- --- --- --- ---	
KsB, KsD----- Kiva	2A	Slight	Slight	Slight	Slight	Sugar maple----- American basswood--- Quaking aspen----- Bigtooth aspen----- White spruce----- Balsam fir----- Northern red oak----- Red pine----- Eastern white pine---	53 --- --- 62 --- --- 67 50 ---	34 --- --- 68 --- --- 61 75 ---	Red pine, eastern white pine.
LoA, LoB----- Longrie	3D	Slight	Moderate	Slight	Moderate	Sugar maple----- Yellow birch----- American beech----- Quaking aspen----- Red pine----- American basswood--- Black cherry----- Balsam fir-----	61 --- --- --- --- --- --- ---	38 --- --- --- --- --- --- ---	Red pine, eastern white pine, white spruce.

See footnotes at end of table.

TABLE 4.--WOODLAND MANAGEMENT AND PRODUCTIVITY--Continued

Soil name and map symbol	Ordi- nation symbol	Erosion hazard	Management concerns			Potential productivity			
			Equip- ment limita- tion	Seedling mortal- ity	Wind- throw hazard	Common trees	Site index	Volume*	Trees to plant
LaD**: Longrie-----	3D	Slight	Moderate	Slight	Moderate	Sugar maple----- Yellow birch----- American beech----- Quaking aspen----- Red pine----- American basswood----- Black cherry----- Balsam fir-----	61 --- --- --- --- --- --- ---	38 --- --- --- --- --- --- ---	Red pine, eastern white pine, white spruce.
Summerville----	2D	Slight	Moderate	Moderate	Severe	Sugar maple----- Paper birch----- American beech----- Quaking aspen----- Northern whitecedar----- Balsam fir----- Red pine----- Eastern white pine----- American basswood-----	57 53 --- --- --- --- --- --- ---	38 53 --- --- --- --- --- --- ---	White spruce, eastern white pine.
McB, McD----- Mancelona	3A	Slight	Slight	Slight	Slight	Sugar maple----- Northern red oak----- Red pine----- Jack pine----- Eastern white pine----- Yellow birch-----	58 --- --- --- --- ---	38 --- --- --- --- ---	Red pine, eastern white pine, jack pine.
MLB----- Melita	3S	Slight	Moderate	Moderate	Slight	Sugar maple----- Quaking aspen----- Red pine----- Red maple----- Eastern white pine----- Yellow birch----- American basswood----- Black cherry----- American beech-----	61 --- --- --- --- --- --- --- ---	38 --- --- --- --- --- --- --- ---	Red pine, eastern white pine.
MnB, MnD----- Menominee	6A	Slight	Slight	Slight	Slight	Quaking aspen----- Sugar maple----- Red pine----- Black cherry----- Paper birch----- Yellow birch----- American basswood----- Northern red oak----- Bigtooth aspen----- White ash-----	74 --- 62 --- --- --- --- 63 76 77	86 --- 107 --- --- --- --- 56 89 76	Red pine, white spruce, eastern white pine.
MuB, MuD----- Munising	3W	Slight	Severe	Slight	Moderate	Sugar maple----- Yellow birch----- Eastern hemlock----- Red maple----- Bigtooth aspen----- Balsam fir----- Paper birch----- White spruce-----	63 --- --- --- --- --- --- ---	39 --- --- --- --- --- --- ---	White spruce, Norway spruce, red pine, eastern white pine.

See footnotes at end of table.

TABLE 4.--WOODLAND MANAGEMENT AND PRODUCTIVITY--Continued

Soil name and map symbol	Ordi- nation symbol	Erosion hazard	Management concerns			Potential productivity			Trees to plant
			Equip- ment limita- tion	Seedling mortal- ity	Wind- throw hazard	Common trees	Site index	Volume*	
MuE----- Munising	3R	Moderate	Moderate	Slight	Moderate	Sugar maple----- Yellow birch----- Eastern hemlock----- Red maple----- Bigtooth aspen----- Balsam fir----- Paper birch----- White spruce----- Quaking aspen-----	63	39	Norway spruce, white spruce, red pine, eastern white pine.
Nh----- Nahma	4W	Slight	Severe	Severe	Severe	Balsam fir----- Quaking aspen----- Paper birch----- Northern whitecedar----- Black ash----- Red maple----- Yellow birch-----	35	60	
NsA, NsB----- Nester	3L	Slight	Moderate	Slight	Slight	Sugar maple----- Quaking aspen----- White ash----- American basswood----- Northern red oak----- Black cherry----- American beech-----	66	41	White spruce, red pine, eastern white pine.
OnA, OnB, OnC, OnD----- Onaway	3L	Slight	Moderate	Slight	Slight	Sugar maple----- Quaking aspen----- Balsam fir----- Yellow birch----- Northern red oak----- Red pine----- American basswood----- White ash-----	65	40	White spruce, red pine, Norway spruce.
CoE**: Onota-----	3R	Moderate	Moderate	Slight	Slight	Sugar maple----- Eastern hemlock----- Yellow birch----- Paper birch----- Red maple----- Quaking aspen----- American beech----- Eastern white pine-----	61	38	White spruce, red pine, eastern white pine.
Chippeny-----	4W	Slight	Severe	Severe	Severe	Balsam fir----- Black ash----- Paper birch----- Northern whitecedar----- Yellow birch----- Red maple----- Black spruce----- Eastern hemlock----- Quaking aspen-----	35	51	

See footnotes at end of table.

TABLE 4.--WOODLAND MANAGEMENT AND PRODUCTIVITY--Continued

Soil name and map symbol	Ordi- nation	Erosion hazard	Management concerns			Potential productivity				Trees to plant
			Equip- ment limita- tion	Seedling mortal- ity	Wind- throw hazard	Common trees	Site index	Volume*		
OrB**, OrD**: Onota-----	3L	Slight	Moderate	Slight	Slight	Sugar maple----- Eastern hemlock----- Yellow birch----- Paper birch----- Red maple----- Quaking aspen----- American beech----- Eastern white pine-----	61	38	White spruce, red pine, eastern white pine.	
Deerton-----	3D	Slight	Slight	Moderate	Moderate	Sugar maple----- Quaking aspen----- American basswood----- Balsam fir----- Paper birch----- Red maple----- Yellow birch----- Bigtooth aspen----- Eastern hemlock-----	60	38	Red pine, jack pine.	
OtB----- Otisco	4W	Slight	Severe	Moderate	Severe	Quaking aspen----- Yellow birch----- Balsam fir----- White spruce----- Red maple----- American elm----- Bigtooth aspen----- Jack pine-----	60	64	White spruce, northern whitecedar, eastern white pine.	
Pc----- Pickford	6W	Slight	Severe	Severe	Severe	White spruce----- Balsam fir----- Paper birch----- Eastern hemlock----- Quaking aspen----- Northern whitecedar----- Black ash-----	45	84	White spruce, eastern white pine.	
PfA----- Algonquin	6W	Slight	Severe	Moderate	Severe	Balsam fir----- Quaking aspen----- Balsam poplar----- Paper birch----- Black ash----- Red maple----- Northern whitecedar-----	45	83	White spruce, eastern white pine, northern whitecedar.	
PkA**: Algonquin-----	6W	Slight	Severe	Moderate	Severe	Balsam fir----- Quaking aspen----- Balsam poplar----- Paper birch----- Black ash----- Red maple----- Northern whitecedar-----	45	83	White spruce, eastern white pine, northern whitecedar.	

See footnotes at end of table.

TABLE 4.--WOODLAND MANAGEMENT AND PRODUCTIVITY--Continued

Soil name and map symbol	Ordi- nation symbol	Erosion hazard	Management concerns			Potential productivity			
			Equip- ment limita- tion	Seedling mortal- ity	Wind- throw hazard	Common trees	Site index	Volume*	Trees to plant
PkA**: Pickford-----	6W	Slight	Severe	Severe	Severe	White spruce----- Balsam fir----- Paper birch----- Eastern hemlock----- Quaking aspen----- Northern whitecedar----- Black ash-----	45 45 --- --- --- --- ---	85 83 --- --- --- --- ---	White spruce, eastern white pine.
Rc----- Roscommon	6W	Slight	Severe	Severe	Severe	Quaking aspen----- Black spruce----- Northern whitecedar----- Jack pine----- Balsam fir----- Red maple-----	74 --- --- --- --- ---	86 --- --- --- --- ---	Black spruce, northern whitecedar, tamarack.
RkB**: Roscommon-----	6W	Slight	Severe	Severe	Severe	Quaking aspen----- Black spruce----- Northern whitecedar----- Jack pine----- Balsam fir----- Red maple-----	74 --- --- --- --- ---	86 --- --- --- --- ---	Black spruce, northern whitecedar, tamarack.
Kalkaska-----	3S	Slight	Moderate	Moderate	Slight	Sugar maple----- Quaking aspen----- Red pine----- Eastern white pine----- American beech----- Paper birch----- Northern red oak----- Red maple----- Bigtooth aspen-----	64 --- --- --- --- --- --- 63 80	40 --- --- --- --- --- --- 39 94	Red pine, eastern white pine.
RoB, RoD----- Rousseau	5S	Slight	Moderate	Moderate	Slight	Quaking aspen----- Red maple----- Balsam fir----- Northern red oak----- Eastern hemlock----- Red pine----- Jack pine----- Paper birch----- Bigtooth aspen-----	65 60 --- --- --- --- 62 65 66	73 38 --- --- --- --- 89 73 75	Red pine, jack pine.
RsD----- Rousseau	5R	Moderate	Moderate	Moderate	Slight	Quaking aspen----- Red maple----- Balsam fir----- Northern red oak----- Eastern hemlock----- Red pine----- Jack pine----- Paper birch----- Bigtooth aspen-----	65 60 --- --- --- --- 62 65 66	73 38 --- --- --- --- 89 73 75	Red pine, jack pine.

See footnotes at end of table.

TABLE 4.--WOODLAND MANAGEMENT AND PRODUCTIVITY--Continued

Soil name and map symbol	Ordi- nation	Erosion hazard	Management concerns			Potential productivity				Trees to plant
			Equip- ment limita- tion	Seedling mortal- ity	Wind- throw hazard	Common trees	Site index	Volume*		
RuB, RuD----- Rubicon	4S	Slight	Moderate	Moderate	Slight	Quaking aspen-----	60	64	Red pine, jack pine, eastern white pine.	
						Jack pine-----	53	73		
						Red pine-----	53	82		
						Bigtooth aspen-----	66	75		
						Northern red oak-----	---	---		
						Red maple-----	57	36		
						Paper birch-----	---	---		
						Eastern white pine--	45	75		
						White oak-----	---	---		
RuE----- Rubicon	4R	Moderate	Moderate	Moderate	Slight	Quaking aspen-----	60	64	Red pine, jack pine, eastern white pine.	
						Jack pine-----	53	73		
						Red pine-----	53	82		
						Bigtooth aspen-----	66	75		
						Northern red oak-----	---	---		
						Red maple-----	57	36		
						Paper birch-----	---	---		
						Eastern white pine--	45	75		
						White oak-----	---	---		
Rv----- Ruse	5W	Slight	Severe	Severe	Severe	Balsam fir-----	40	71	Eastern white pine, white spruce, red pine.	
						Black spruce-----	---	---		
						Northern whitecedar-----	---	---		
						Paper birch-----	---	---		
						Quaking aspen-----	---	---		
ScA----- Finch	4W	Slight	Severe	Moderate	Severe	Quaking aspen-----	56	56	Eastern white pine, white spruce, red pine.	
						Northern red oak-----	56	44		
						Paper birch-----	54	55		
						Red maple-----	56	36		
						Eastern white pine--	53	99		
						Jack pine-----	52	71		
						Black spruce-----	38	49		
ShB----- Sheildrake	6S	Slight	Moderate	Moderate	Slight	Red pine-----	54	85	Red pine, eastern white pine, jack pine.	
						Eastern white pine--	---	---		
						Paper birch-----	---	---		
						Quaking aspen-----	---	---		
						Northern pin oak-----	---	---		
						Jack pine-----	---	---		
						Red maple-----	---	---		
SkB----- Skaneee	3W	Slight	Severe	Moderate	Severe	Red maple-----	60	38	White spruce, eastern white pine.	
						Sugar maple-----	60	38		
						Yellow birch-----	---	---		
						Eastern hemlock-----	---	---		
						Balsam fir-----	---	---		
						Quaking aspen-----	---	---		
						Paper birch-----	---	---		
						Northern whitecedar-----	---	---		

See footnotes at end of table.

TABLE 4.--WOODLAND MANAGEMENT AND PRODUCTIVITY--Continued

Soil name and map symbol	Ordi- nation symbol	Erosion hazard	Management concerns			Potential productivity			
			Equip- ment limita- tion	Seedling mortal- ity	Wind- throw hazard	Common trees	Site index	Volume*	Trees to plant
StB, StD----- Steuben	3D	Slight	Moderate	Slight	Moderate	Sugar maple----- Quaking aspen----- Yellow birch----- Eastern hemlock----- American basswood----- Paper birch----- Balsam fir----- Black cherry-----	61	38	Red pine, Norway spruce, eastern white pine.
SuA----- Summerville	2D	Slight	Moderate	Moderate	Severe	Sugar maple----- Paper birch----- American beech----- Quaking aspen----- Northern whitecedar----- Balsam fir----- Red pine----- Eastern white pine----- American basswood-----	57	36	Northern whitecedar, white spruce, eastern white pine.
SvA----- Sundell	2W	Slight	Severe	Moderate	Severe	Red maple----- Paper birch----- Balsam fir----- Quaking aspen----- Northern whitecedar----- Balsam poplar-----	55	35	White spruce, Norway spruce.
SwA----- Sundell variant	6W	Slight	Severe	Moderate	Moderate	Quaking aspen----- Red maple----- Paper birch----- Balsam fir----- Eastern hemlock-----	75	87	White spruce, Norway spruce, eastern white pine.
Ta----- Tawas	5W	Slight	Severe	Severe	Severe	Balsam fir----- Northern whitecedar----- Quaking aspen----- Black ash----- Red maple-----	40	71	
TrA, TrB, TrC, TrD----- Trenary	3L	Slight	Moderate	Slight	Slight	Sugar maple----- American basswood----- Yellow birch----- American beech----- Quaking aspen----- Balsam fir----- Eastern hemlock-----	61	38	White spruce, red pine, eastern white pine.
WaA----- Wainola	6W	Slight	Severe	Moderate	Severe	Quaking aspen----- White ash----- Red maple----- Paper birch-----	75	89	White spruce, Norway spruce, eastern white pine.

See footnotes at end of table.

TABLE 4.--WOODLAND MANAGEMENT AND PRODUCTIVITY--Continued

Soil name and map symbol	Ordi- nation symbol	Erosion hazard	Management concerns			Potential productivity			
			Equip- ment limitation	Seedling mortality	Wind- throw hazard	Common trees	Site index	Volume*	Trees to plant
W1B, W1D----- Wallace	6D	Slight	Moderate	Moderate	Slight	Red pine----- Red maple----- Eastern white pine-- Black spruce----- Eastern hemlock----- Balsam fir----- Paper birch----- Quaking aspen----- Sugar maple-----	55 --- 52 --- --- --- 63 75 ---	88 --- 96 --- --- --- 70 87 ---	Red pine, white spruce.
Wm----- Wheatley	2W	Slight	Severe	Severe	Severe	Quaking aspen----- Balsam fir----- Northern whitecedar- Black spruce----- Red maple----- Eastern hemlock-----	45 40 15 15 40 ---	32 71 23 23 28 ---	White spruce, Norway spruce, eastern white pine.
YaB, YaD----- Yalmer	3D	Slight	Moderate	Moderate	Moderate	Sugar maple----- American beech----- Yellow birch----- Balsam fir----- Eastern hemlock----- Red maple----- Paper birch----- Quaking aspen-----	61 --- --- --- --- 61 --- ---	38 --- --- --- --- 38 --- ---	Red pine, Norway spruce, European larch.

* Volume is the yield in cubic feet per acre per year calculated at the age of culmination of mean annual increment for fully stocked natural stands.

** See description of the map unit for composition and behavior characteristics of the map unit.

TABLE 5.--EQUIPMENT LIMITATIONS ON WOODLAND

(Some terms that describe restrictive soil features are defined in the "Glossary." See text for definitions of "moderate", and "severe". Absence of an entry indicates that the soil was not rated)

Soil name and map symbol	Ratings for most limiting season(s)			Preferred operating season(s)	Ratings for preferred operation		
	Logging areas and skid roads	Log landings	Haul roads		Logging areas and skid roads	Log landings	
AlC-- Alpena	Slight	Slight	Slight	Year-round	Slight	Slight	Slight
AuB-- Au Gres	Severe: wetness.	Severe: wetness.	Summer, winter wetness.	Summer, winter	Slight	Slight	Slight
AvA-- Battlefield	Severe: wetness.	Severe: wetness.	Summer, winter wetness.	Summer, winter	Slight	Slight	Slight
B1B-- Blue Lake	Moderate: too sandy.	Moderate: too sandy.	Spring, fall, winter. too sandy.	Spring, fall, winter.	Slight	Slight	Slight
B1D, B1E-- Blue Lake	Moderate: too sandy.	Moderate: too sandy.	Spring, fall, winter. too sandy. slope.	Spring, fall, winter.	Slight	Slight	Moderate: slope.
BoB-- Bohemian	Moderate: low strength.	Moderate: low strength.	Moderate: low strength.	Summer, fall, winter.	Slight	Slight	Slight
BoD-- Bohemian	Moderate: low strength.	Moderate: low strength.	Moderate: low strength. slope.	Summer, fall, winter.	Slight	Slight	Moderate: slope.
BrA-- Bowers	Severe: wetness.	Severe: wetness.	Summer, winter wetness.	Summer, winter	Slight	Slight	Slight
Bs-- Brevort	Severe: wetness.	Severe: wetness.	Summer, winter wetness.	Summer, winter	Slight	Slight	Slight
BtA-- Brimley	Severe: wetness, low strength.	Severe: wetness, low strength.	Severe: wetness, low strength.	Summer, winter wetness, low strength.	Slight	Slight	Slight
Bu-- Bruce variant	Severe: wetness, low strength.	Severe: wetness, low strength.	Severe: wetness, low strength.	Summer, winter wetness, low strength.	Slight	Slight	Slight
BwC-- Burt	Severe: wetness.	Severe: wetness.	Summer, winter wetness.	Summer, winter wetness.	Slight	Slight	Slight

See footnote at end of table.

TABLE 5.--EQUIPMENT LIMITATIONS ON WOODLAND--Continued

Soil name and map symbol	Ratings for most limiting season(s)			Preferred operating season(s)	Ratings for preferred operating season(s)		
	Logging areas and skid roads	Log landings	Haul roads		Logging areas and skid roads	Log landings	
cb* : Carbondale	Severe: wetness, low strength.	Severe: wetness, low strength.	Severe: wetness, low strength.	Winter	Moderate: low strength.	Severe: low strength.	
Lupton--	Severe: wetness, low strength.	Severe: wetness, low strength.	Severe: wetness, low strength.	Winter	Moderate: low strength.	Severe: low strength.	
Rifle--	Severe: wetness, low strength.	Severe: wetness, low strength.	Severe: wetness, low strength.	Winter	Moderate: low strength.	Severe: low strength.	
Ch--: Cathro	Severe: wetness, low strength.	Severe: wetness, low strength.	Severe: wetness, low strength.	Winter	Moderate: low strength.	Severe: low strength.	
Cr* : Cathro--	Severe: wetness, low strength.	Severe: wetness, low strength.	Severe: wetness, low strength.	Winter	Moderate: low strength.	Severe: low strength.	
Tacoosh--	Severe: wetness, low strength.	Severe: wetness, low strength.	Severe: wetness, low strength.	Winter	Moderate: low strength.	Severe: low strength.	
CIA--: Charlevoix	Severe: wetness.	Severe: wetness.	Severe: wetness.	Summer, fall, winter.	Slight--	Slight--	
CmA, CmB--: Chatham	Moderate: low strength.	Moderate: low strength.	Moderate: low strength.	Summer, fall, winter.	Slight--	Slight--	
CmD--: Chatham	Moderate: low strength.	Moderate: low strength.	Moderate: low strength.	Summer, fall, winter.	Slight--	Moderate: slope.	
Cn--: Chippeny	Severe: wetness, low strength.	Severe: wetness, low strength.	Severe: wetness, low strength.	Winter	Moderate: low strength.	Severe: low strength.	
Cra--: Crosswell	Moderate: too sandy.	Moderate: too sandy.	Spring, fall, winter.	Slight--	Slight--	Slight--	

See footnote at end of table.

TABLE 5.--EQUIPMENT LIMITATIONS ON WOODLAND--Continued

Soil name and map symbol	Ratings for most limiting season(s)			Preferred operating season(s)	Ratings for preferred operating season(s)		
	Logging areas and skid roads	Log landings	Haul roads		Logging areas and skid roads	Log landings	
Da----- Dawson	Severe: wetness, low strength.	Severe: wetness, low strength.	Severe: wetness, low strength.	Winter	Moderate: low strength.	Severe: low strength.	
Dd*: Dawson	Severe: wetness, low strength.	Severe: wetness, low strength.	Severe: wetness, low strength.	Winter	Moderate: low strength.	Severe: low strength.	
Greenwood-----	Severe: wetness, low strength.	Severe: wetness, low strength.	Severe: wetness, low strength.	Winter	Moderate: low strength.	Severe: low strength.	
DeB----- Deerton	Moderate: too sandy.	Moderate: too sandy.	Moderate: too sandy.	Spring, fall, winter.	Slight---	Slight---	
DeD----- Deerton	Moderate: too sandy.	Moderate: too sandy.	Moderate: too sandy.	Spring, fall, winter.	Slight---	Moderate: slope.	
DIB*: Deerton	Moderate: too sandy.	Moderate: too sandy.	Moderate: too sandy.	Spring, fall, winter.	Slight---	Slight---	
Burt-----	Severe: wetness.	Severe: wetness.	Severe: wetness.	Summer, winter	Slight---	Slight	
Dm----- Deford	Severe: wetness.	Severe: wetness.	Severe: wetness.	Summer, winter	Slight	Slight	
DuB-----	Slight---	Slight---	Slight---	Year-round	Slight	Slight	
Duel							
EaB----- Springlake	Moderate: too sandy.	Moderate: too sandy.	Moderate: too sandy.	Spring, fall, winter.	Slight	Slight	
EcB----- Adams	Moderate: too sandy.	Moderate: too sandy.	Moderate: too sandy.	Spring, fall, winter.	Slight	Slight	
EcD----- Adams	Moderate: too sandy.	Moderate: too sandy.	Moderate: too sandy.	Spring, fall, winter.	Slight	Moderate: slope.	

See footnote at end of table.

TABLE 5. --EQUIPMENT LIMITATIONS ON WOODLAND--Continued

Soil name and map symbol	Ratings for most limiting season(s)				Preferred operating season(s)	Ratings for preferred operating areas		Log landings
	Logging areas and skid roads	Log landings	Haul roads	and skid roads		Logging areas and skid roads	Log landings	
EdB----- Eastport	Moderate: too sandy.	Moderate: too sandy.	Moderate: too sandy.	Moderate: too sandy.	Spring, fall, winter.	Slight-----	Slight-----	Slight-----
EeB*----- Eastport	Moderate: too sandy.	Moderate: too sandy.	Moderate: too sandy.	Moderate: too sandy.	Spring, fall, winter.	Slight-----	Slight-----	Slight-----
Roscommon-----	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Summer, winter	Slight-----	Slight-----	Slight-----
EmA, EmB----- Emmet	Moderate: low strength.	Moderate: low strength.	Moderate: low strength.	Moderate: low strength.	Summer, fall, winter.	Slight-----	Slight-----	Slight-----
EmC----- Emmet	Moderate: low strength.	Moderate: low strength.	Moderate: low strength.	Moderate: low strength.	Summer, fall, winter.	Slight-----	Moderate: slope.	Moderate: slope.
EnA----- Ensign	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Summer, winter	Slight-----	Severe: depth to root	Severe: depth to root
Es*----- Ensley	Severe: wetness, low strength.	Severe: wetness, low strength.	Severe: wetness, low strength.	Severe: wetness, low strength.	Summer, winter	Slight-----	Slight-----	Slight-----
Angelica-----	Severe: wetness, low strength.	Severe: wetness, low strength.	Severe: wetness, low strength.	Severe: wetness, low strength.	Summer, winter	Slight-----	Slight-----	Slight-----
FaA----- Fairport	Moderate: low strength.	Moderate: low strength.	Moderate: low strength.	Moderate: low strength.	Summer, fall, winter.	Slight-----	Slight-----	Slight-----
FaB----- Fairport	Moderate: low strength.	Moderate: low strength.	Moderate: low strength.	Moderate: low strength.	Summer, fall, winter.	Slight-----	Slight-----	Slight-----
GcB----- Gilchrist	Moderate: too sandy.	Moderate: too sandy.	Moderate: too sandy.	Moderate: too sandy.	Spring, fall, winter.	Slight-----	Slight-----	Slight-----
GrB----- Grayling	Moderate: too sandy.	Moderate: too sandy.	Moderate: too sandy.	Moderate: too sandy.	Spring, fall, winter.	Slight-----	Slight-----	Slight-----
GrD----- Grayling	Moderate: too sandy.	Moderate: too sandy.	Moderate: too sandy.	Moderate: slope.	Spring, fall, winter.	Slight-----	Moderate: slope.	Moderate: slope.

See footnote at end of table.

TABLE 5.--EQUIPMENT LIMITATIONS ON WOODLAND--Continued

Soil name and map symbol	Ratings for most limiting season(s)				Preferred operating season(s)	Ratings for preferred operation	
	Logging areas and skid roads	Log landings	Haul roads	Logging areas and skid roads		Logging areas and skid roads	Log landings
Gw--Greenwood	Severe: wetness, low strength.	Severe: wetness, low strength.	Severe: wetness, low strength.	Severe: wetness, low strength.	Winter	Moderate: low strength.	Severe: low strength.
IoB--Tosco	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Summer, fall, winter.	Slight	Slight
KaB--Kalkaska	Moderate: too sandy.	Moderate: too sandy.	Moderate: too sandy.	Moderate: too sandy.	Spring, fall, winter.	Slight	Slight
KaD--Kalkaska	Moderate: too sandy.	Moderate: too sandy.	Moderate: too sandy.	Moderate: too sandy.	Spring, fall, winter.	Slight	Moderate: slope.
KaE--Kalkaska	Moderate: too sandy, slope.	Severe: slope.	Moderate: too sandy, slope.	Moderate: too sandy, slope.	Spring, fall, winter.	Moderate: slope.	Severe: slope.
KdB--Karlin	Slight	Slight	Slight	Year-round	Year-round	Slight	Slight
KdD--Karlin	Slight	Moderate: slope.	Slight	Year-round	Slight	Moderate: slope.	Moderate: slope.
KgC--Kawbawgum	Severe: wetness.	Severe: wetness.	Severe: wetness.	Summer, fall, winter.	Slight	Moderate: depth to rock, slope.	Moderate: slope.
KlA--Kawaklin	Severe: wetness, low strength.	Severe: wetness, low strength.	Severe: wetness, low strength.	Summer, winter	Slight	Slight	Slight
KnB--Keweensaw	Slight	Slight	Slight	Year-round	Slight	Slight	Slight
KnD--Keweensaw	Slight	Moderate: slope.	Slight	Year-round	Slight	Slight	Moderate: slope.
Kr--Kinross	Severe: wetness, low strength.	Severe: wetness, low strength.	Severe: wetness, low strength.	Summer, winter	Slight	Slight	Slight
KsB--Kiva	Slight	Slight	Slight	Year-round	Slight	Slight	Slight

See footnote at end of table.

TABLE 5.--EQUIPMENT LIMITATIONS ON WOODLAND--Continued

Soil name and map symbol	Ratings for most limiting season(s)			Preferred operating season(s)	Ratings for preferred operating areas		
	Logging areas and skid roads	Log landings	Haul roads		Logging areas and skid roads	Log landings	
KsD-- Kiva	Slight	Moderate: slope.	Slight	Year-round	Slight	Moderate: slope.	Moderate: slope.
LoA, LoB-- Longrie	Slight	Moderate: depth to rock.	Moderate: depth to rock.	Year-round	Slight	Moderate: depth to rock.	Moderate: depth to rock.
LsD*: Longrie	Slight	Moderate: depth to rock, slope.	Moderate: depth to rock.	Year-round	Slight	Moderate: depth to rock, slope.	Moderate: depth to rock.
Summerville----	Slight	Severe: depth to rock.	Severe: depth to rock.	Year-round	Slight	Severe: depth to rock.	Severe: depth to rock.
McB----	Slight	Slight	Slight	Year-round	Slight	Slight	Slight
Mancelona	Slight	Moderate: slope.	Moderate: slope.	Year-round	Slight	Moderate: slope.	Moderate: slope.
McD-- Mancelona	Moderate: too sandy.	Moderate: too sandy.	Moderate: too sandy.	Spring, fall, winter.	Slight	Slight	Slight
MlB-- Melita	Slight	Slight	Slight	Year-round	Slight	Slight	Slight
MnB-- Menominee	Slight	Moderate: slope.	Moderate: slope.	Year-round	Slight	Moderate: slope.	Moderate: slope.
MnD-- Menominee	Slight	Severe: wetness.	Severe: wetness.	Year-round	Slight	Slight	Slight
MnD-- Munising	Severe: wetness.	Severe: wetness.	Severe: wetness.	Summer, winter	Slight	Moderate: slope.	Moderate: slope.
MnD-- Munising	Severe: wetness.	Severe: wetness.	Severe: wetness.	Summer, winter	Slight	Moderate: slope.	Moderate: slope.
MnE-- Munising	Moderate: slope.	Moderate: slope.	Moderate: slope.	Summer, winter	Moderate: slope.	Severe: slope.	Severe: slope.
Nh-- Nahma	Severe: wetness.	Severe: wetness.	Severe: wetness.	Summer, winter	Slight	Slight	Slight
NsA, NsB-- Nester	Moderate: low strength.	Moderate: low strength.	Moderate: low strength.	Summer, fall, winter.	Slight	Slight	Slight

See footnote at end of table.

TABLE 5.--EQUIPMENT LIMITATIONS ON WOODLAND--Continued

Soil name and map symbol	Ratings for most limiting season(s)			Preferred operating season(s)	Ratings for preferred operation		
	Logging areas and skid roads	Log landings	Haul roads		Logging areas and skid roads	Log landings	
OnA, OnB Onaway	Moderate: low strength.	Moderate: low strength.	Moderate: low strength.	Summer, fall, winter.	Slight-----	Slight-----	Slight-----
OnC, OnD Onaway	Moderate: low strength.	Moderate: low strength.	Moderate: low strength.	Summer, fall, winter.	Slight-----	Moderate: slope.	Moderate: slope.
OrE*: Onota--	Moderate: slope.	Severe: slope.	Moderate: slope.	Year-round-----	Moderate: slope.	Severe: slope.	Severe: slope.
Chippeny	Severe: wetness,	Severe: wetness,	Severe: wetness,	Summer, winter	Moderate: low strength.	Severe: low strength.	Severe: low strength.
OrB*: Onota--	Moderate: low strength.	Moderate: low strength.	Moderate: low strength.	Summer, fall, winter.	Slight-----	Slight-----	Slight-----
Deerton--	Moderate: too sandy.	Moderate: too sandy.	Moderate: too sandy.	Spring, fall, winter.	Slight-----	Slight-----	Slight-----
OrD*: Onota--	Moderate: low strength.	Moderate: low strength.	Moderate: low strength.	Summer, fall, winter.	Slight-----	Slight-----	Slight-----
Deerton--	Moderate: too sandy.	Moderate: too sandy.	Moderate: too sandy.	Summer, fall, winter.	Slight-----	Slight-----	Slight-----
OtB-- Otisco	Severe: wetness.	Severe: wetness.	Severe: wetness.	Summer, fall, winter.	Slight-----	Slight-----	Slight-----
Pc-- Pickford	Severe: wetness,	Severe: wetness,	Severe: wetness,	Summer, winter	Slight-----	Slight-----	Slight-----
Pfa-- Algonquin	Severe: wetness,	Severe: wetness,	Severe: wetness,	Summer, winter	Slight-----	Slight-----	Slight-----

See footnote at end of table.

TABLE 5.--EQUIPMENT LIMITATIONS ON WOODLAND--Continued

Soil name and map symbol	Ratings for most limiting season(s)			Preferred operating season(s)	Ratings for preferred operation	
	Logging areas and skid roads	Log landings	Haul roads		Logging areas and skid roads	Log landings
PkA:*						
Algonquin	Severe: wetness, low strength.	Severe: wetness, low strength.	Severe: wetness, low strength.	Summer, winter	Slight	Slight
Pickford	Severe: wetness, low strength.	Severe: wetness, low strength.	Severe: wetness, low strength.	Summer, winter	Slight	Slight
Rc	Severe: wetness, low strength.	Severe: wetness, low strength.	Severe: wetness, low strength.	Summer, winter	Slight	Slight
RkB:*	Severe: wetness.	Severe: wetness.	Severe: wetness.	Summer, winter	Slight	Slight
Roscommon	Moderate: too sandy.	Moderate: too sandy.	Moderate: too sandy.	Spring, fall, winter.	Slight	Slight
Kalkaska	Slight	Slight	Slight	Year-round	Slight	Slight
RoB						
Rousseau	Slight	Moderate: slope.	Moderate: slope.	Year-round	Slight	Moderate: slope.
RoD						
Rousseau	Moderate: slope.	Severe: slope.	Moderate: slope.	Year-round	Moderate: slope.	Severe: slope.
RoE						
Rousseau	Moderate: too sandy.	Moderate: too sandy.	Moderate: too sandy.	Spring, fall, winter.	Slight	Slight
RuB						
Rubicon	Moderate: too sandy.	Moderate: too sandy.	Moderate: too sandy.	Summer, fall, winter.	Slight	Moderate: slope.
RuD						
Rubicon	Moderate: too sandy.	Moderate: too sandy.	Moderate: too sandy, slope.	Summer, fall, winter.	Slight	Severe: slope.
RuE						
Rubicon	Moderate: too sandy.	Severe: wetness.	Severe: wetness.	Summer, fall, winter.	Moderate: slope.	Severe: slope.
Rv						
Ruse						

See footnote at end of table.

TABLE 5.--EQUIPMENT LIMITATIONS ON WOODLAND--Continued

Soil name and map symbol	Ratings for most limiting season(s)				Preferred operating season(s)	Ratings for preferred operation		
	Logging areas and skid roads	Log landings	Haul roads	and skid roads		Logging areas and skid roads	Log landings	
ScA-- Finch	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Summer, winter	Slight	Slight	Slight
ShB-- Sheildrake	Moderate: too sandy.	Moderate: too sandy.	Moderate: too sandy.	Moderate: too sandy.	Spring, fall, winter.	Slight	Slight	Slight
SkB-- Skane	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Summer, winter	Slight	slight	slight
StB-- Steuben	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Summer, winter	Slight	Slight	Slight
StD-- Steuben	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Summer, winter	Slight	Moderate: slope.	Moderate: slope.
SuA-- Summerville	Slight	Slight	Moderate: depth to rock.	Year-round	Slight	Slight	Slight	Slight
SvA-- Sundell	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Summer, winter	Slight	Slight	Slight
SwA-- Sundell variant	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Summer, fall, winter.	Slight	Moderate: depth to rock.	Moderate: depth to rock.
Ta-- Tawas	Severe: wetness, low strength.	Severe: wetness, low strength.	Severe: wetness, low strength.	Severe: wetness, low strength.	Winter	Moderate: low strength.	Severe: low strength.	Severe: low strength.
TrA, TrB-- Trenary	Moderate: low strength.	Moderate: low strength.	Moderate: low strength.	Moderate: low strength.	Summer, fall, winter.	Slight	slight	slight
TrC, TrD-- Trenary	Moderate: low strength.	Moderate: low strength.	Moderate: low strength.	Moderate: low strength.	Summer, fall, winter.	Slight	Moderate: slope.	Moderate: slope.
WaA-- Wainola	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Summer, fall, winter.	Slight	Slight	Slight
WlB-- Wallace	Moderate: too sandy.	Moderate: too sandy.	Moderate: too sandy.	Moderate: too sandy.	Spring, fall, winter.	Slight	Slight	Slight
WlD-- Wallace	Moderate: too sandy.	Moderate: too sandy.	Moderate: too sandy.	Moderate: too sandy.	Spring, fall, winter.	Slight	Moderate: slope.	Moderate: slope.

See footnote at end of table.

TABLE 5. --EQUIPMENT LIMITATIONS ON WOODLAND--Continued

Soil name and map symbol	Ratings for most limiting season(s)			Preferred operating season(s)	Ratings for preferred operation		
	Logging areas and skid roads	Log landings	Haul roads		Logging areas and skid roads	Log landings	
Wm-----Wheatley	Severe: wetness, low strength.	Severe: wetness, low strength.	Severe: wetness, low strength.	Summer, winter	Slight	Slight	Slight
YaB-----Yalmer	Moderate: too sandy.	Moderate: too sandy.	Moderate: too sandy.	Spring, fall, winter.	Slight	Slight	Slight
YaD-----Yalmer	Moderate: too sandy.	Moderate: too sandy.	Moderate: too sandy.	Spring, fall, winter.	Slight	Slight	Moderate: slope.

* See description of the map unit for composition and behavior characteristics of the map unit.

TABLE 6.--WINDBREAKS AND ENVIRONMENTAL PLANTINGS

(The symbol < means less than; > means more than. Absence of an entry indicates that trees generally do not grow to the given height on that soil)

Soil name and map symbol	Trees having predicted 20-year average height, in feet, of--			
	8-15	16-25	26-35	>35
Ad*. Alluvial land				
A1C. Alpena				
AuB-----	American	White spruce, jack	Norway spruce, green	
Au Gres	cranberrybush, Amur maple, common ninebark, nannyberry viburnum.	pine, Manchurian crabapple.	ash, eastern white pine.	Imperial Carolina poplar.
AvA-----	Northern whitecedar, silky dogwood, American	White spruce, Siberian crabapple.	Norway spruce, eastern white pine, green ash.	---
Battlefield	cranberrybush, common ninebark, nannyberry viburnum, Amur maple, lilac.			
B1B, B1D, B1E----	Lilac, smooth sumac, eastern redcedar, Siberian peashrub, silver buffaloberry, staghorn sumac.	Red pine, jack pine, eastern white pine, Austrian pine.	---	---
BoB, BoD-----	Arrowwood, common ninebark, nannyberry viburnum, American cranberrybush, northern whitecedar, Roselow sargent crabapple.	White spruce, Siberian crabapple.	Norway spruce, red pine, eastern white pine, green ash.	---
Bp*. Borrow pits				
BrA-----	American	White spruce,	Eastern white pine,	---
Bowers	cranberrybush, northern whitecedar, common ninebark, lilac, nannyberry viburnum.	Manchurian crabapple.	Norway spruce, green ash, red pine.	
Bs. Brevort				
BtA-----	Northern whitecedar, American	White spruce, Manchurian crabapple.	Norway spruce, eastern white pine, green ash.	Carolina poplar.
Brimley	cranberrybush, silky dogwood, common ninebark, nannyberry viburnum, lilac.			
Bu. Bruce variant				

See footnote at end of table.

TABLE 6.--WINDBREAKS AND ENVIRONMENTAL PLANTINGS--Continued

Soil name and map symbol	Trees having predicted 20-year average height, in feet, of--			
	8-15	16-25	26-35	>35
BwC. Burt				
Cb*. Carbondale, Lupton, and Rifle.				
Ch. Cathro				
Ck*. Cathro and Tacoosh				
ClA----- Charlevoix	Northern whitecedar, American cranberrybush, silky dogwood, nannyberry viburnum, common ninebark.	White spruce, Manchurian crabapple, Black Hills spruce.	Red maple, Norway spruce, eastern white pine, green ash.	---
CmA, CmB, CmD----- Chatham	Lilac, Siberian peashrub, eastern redcedar, silver buffaloberry, Manchurian crabapple, Roselow sargent crabapple, common ninebark, Peking cotoneaster.	Red pine, eastern white pine, Austrian pine, green ash.	---	---
Cn. Chippeny				
CrA----- Croswell	Amur maple, lilac, eastern redcedar, Siberian peashrub.	Red pine, jack pine---	Eastern white pine---	---
Da. Dawson				
Dd*. Dawson and Greenwood				
DeB, DeD----- Deerton	Siberian peashrub, lilac, eastern redcedar, staghorn sumac, Amur maple, smooth sumac.	Red pine, jack pine, Austrian pine, eastern white pine.	---	---
DiB*: Deerton-----	Siberian peashrub, lilac, eastern redcedar, staghorn sumac, Amur maple, smooth sumac.	Red pine, jack pine, Austrian pine, eastern white pine.	---	---
Burt.				

See footnote at end of table.

TABLE 6.--WINDBREAKS AND ENVIRONMENTAL PLANTINGS--Continued

Soil name and map symbol	Trees having predicted 20-year average height, in feet, of--			
	8-15	16-25	26-35	>35
Dm----- Deford	Northern whitecedar, nannyberry viburnum, lilac, silky dogwood, American cranberrybush, common ninebark, Amur maple.	Norway spruce, white spruce, green ash.	Eastern white pine----	Imperial Carolina poplar.
DuB----- Duel	Staghorn sumac, eastern redcedar, smooth sumac, lilac, Siberian peashrub, silver buffaloberry.	Red pine, eastern white pine, Austrian pine, jack pine.	---	---
EaB----- Springlake	Eastern redcedar, Siberian peashrub, lilac, smooth sumac, buffaloberry, staghorn sumac.	Red pine, eastern white pine, Austrian pine, jack pine.	---	---
EcB, EcD. Adams				
EdB. Eastport				
EeB*. Eastport- Roscommon				
EmA, EmB, EmC----- Emmet	Arrowwood, lilac, nannyberry viburnum, Siberian peashrub.	White spruce, Siberian crabapple, Austrian pine, eastern redcedar.	Red pine, Norway spruce, eastern white pine.	Imperial Carolina poplar.
EnA. Ensign				
Es*: Ensley-----	American cranberrybush, Roselow sargent crabapple, silky dogwood, arrowwood, nannyberry viburnum, common ninebark.	White spruce, northern whitecedar.	Eastern white pine, green ash, red maple, Norway spruce.	---
Angelica.				
FaA, FaB----- Fairport	Lilac, eastern redcedar, Siberian peashrub, Manchurian crabapple, Amur maple, Roselow sargent crabapple.	Eastern white pine, green ash, jack pine, Austrian pine.	Red pine-----	---

See footnote at end of table.

TABLE 6.--WINDBREAKS AND ENVIRONMENTAL PLANTINGS--Continued

Soil name and map symbol	Trees having predicted 20-year average height, in feet, of--			
	8-15	16-25	26-35	>35
GcB----- Gilchrist	American cranberrybush, common ninebark, silky dogwood, lilac, eastern redcedar, nannyberry viburnum.	Red pine, white spruce, Norway spruce, Siberian crabapple.	Eastern white pine---	Imperial Carolina poplar.
GrB, GrD----- Grayling	Lilac, silver buffaloberry, Siberian peashrub, smooth sumac, eastern redcedar, staghorn sumac.	Jack pine, eastern white pine, red pine.	---	---
Gw. Greenwood				
IoB----- Iosco	Common ninebark, northern whitecedar, American cranberrybush, nannyberry viburnum, lilac, silky dogwood.	White spruce, Manchurian crabapple.	Green ash, eastern white pine, Norway spruce.	Imperial Carolina poplar.
KaB----- Kalkaska	Lilac, silver buffaloberry, smooth sumac, eastern redcedar, Siberian peashrub, staghorn sumac.	Red pine, jack pine, eastern white pine.	---	---
KaD. Kalkaska				
KaE----- Kalkaska	Lilac, silver buffaloberry, smooth sumac, eastern redcedar, Siberian peashrub, staghorn sumac.	Red pine, jack pine, eastern white pine.	---	---
KdB, KdD----- Karlin	Staghorn sumac, lilac, eastern redcedar, Siberian peashrub, smooth sumac.	Red pine, jack pine, eastern white pine, Austrian pine.	---	---
KgC. Kawbawgam				
KlA----- Kawkawlin	Roselow sargent crabapple, silky dogwood, Amur maple, lilac, American cranberrybush, nannyberry viburnum, northern whitecedar, common ninebark.	White spruce, red pine, Norway spruce, eastern white pine.	---	---

See footnote at end of table.

TABLE 6.--WINDBREAKS AND ENVIRONMENTAL PLANTINGS--Continued

Soil name and map symbol	Trees having predicted 20-year average height, in feet, of--			
	8-15	16-25	26-35	>35
KnB, KnD----- Keweenaw	Lilac, northern whitecedar, Amur maple, Siberian peashrub, Peking cotoneaster.	Manchurian crabapple, white spruce, Norway spruce, jack pine.	Red pine, eastern white pine.	Imperial Carolina poplar.
Kr. Kinross				
KsB, KsD----- Kiva	Lilac, Siberian peashrub, eastern redcedar, silver buffaloberry, Siberian crabapple, Roselow sargent crabapple, common ninebark, Peking cotoneaster.	Red pine, jack pine---	---	---
Lb*. Lake beaches				
Lm*. Limestone rock land				
LoA, LoB----- Longrie	Manchurian crabapple, Siberian peashrub, lilac, Amur maple, eastern redcedar, common ninebark.	Jack pine, red pine, Austrian pine, eastern white pine, green ash.	---	---
LsD*: Longrie-----	Manchurian crabapple, Siberian peashrub, lilac, Amur maple, eastern redcedar, common ninebark.	Jack pine, red pine, Austrian pine, eastern white pine, green ash.	---	---
Summerville.				
Ma*. Made land				
McB, McD----- Mancelona	Amur maple, lilac, eastern redcedar, Siberian peashrub, northern whitecedar.	White spruce, jack pine, Manchurian crabapple, Norway spruce.	Red pine, eastern white pine.	Imperial Carolina poplar.
Mh*. Marsh				
MlB----- Melita	Eastern redcedar, Siberian peashrub, lilac, Amur maple.	Red pine, jack pine---	Eastern white pine----	---
MnB, MnD----- Menominee	Sargent crabapple, nannyberry viburnum, Amur maple, eastern redcedar.	Red pine, Norway spruce, white spruce, green ash, Siberian crabapple.	Eastern white pine----	Imperial Carolina poplar.

See footnote at end of table.

TABLE 6.--WINDBREAKS AND ENVIRONMENTAL PLANTINGS--Continued

Soil name and map symbol	Trees having predicted 20-year average height, in feet, of--			
	8-15	16-25	26-35	>35
MuB, MuD----- Munising	Redosier dogwood, Amur maple, American cranberrybush, common ninebark, northern whitecedar, nannyberry viburnum, lilac, silky dogwood.	White spruce, Norway spruce, eastern white pine, Siberian crabapple.	---	---
MuE. Munising				
Nh. Nahma				
NsA----- Nester	Arrowwood, lilac, common ninebark, nannyberry viburnum, Siberian peashrub, silky dogwood.	White spruce, blue spruce, Manchurian crabapple.	Red pine, green ash, eastern white pine.	---
NsB----- Nester	Arrowwood, lilac, nannyberry viburnum, common ninebark, Siberian peashrub.	Blue spruce, white spruce, Manchurian crabapple.	Red pine, green ash, eastern white pine.	---
OnA, OnB, OnC, OnD Onaway	American cranberrybush, silky dogwood, arrowwood, nannyberry viburnum, lilac.	White spruce, Siberian crabapple.	Red pine, eastern white pine, Norway spruce, green ash.	Imperial Carolina poplar.
OcE*: Onota-----	Roselow sargent crabapple, lilac, Manchurian crabapple, eastern redcedar, Amur maple, common ninebark, Siberian peashrub.	Eastern white pine, red pine, jack pine, green ash, Austrian pine.	---	---
Chippeny.				
OrB*, OrD*: Onota-----	Roselow sargent crabapple, lilac, Manchurian crabapple, eastern redcedar, Amur maple, common ninebark, Siberian peashrub.	Eastern white pine, red pine, jack pine, green ash, Austrian pine.	---	---
Deerton-----	Siberian peashrub, lilac, eastern redcedar, staghorn sumac, Amur maple, smooth sumac.	Red pine, jack pine, Austrian pine, eastern white pine.	---	---

See footnote at end of table.

TABLE 6.--WINDBREAKS AND ENVIRONMENTAL PLANTINGS--Continued

Soil name and map symbol	Trees having predicted 20-year average height, in feet, of--			
	8-15	16-25	26-35	>35
OtB----- Otisco	American cranberrybush, Roselow sargent crabapple, silky dogwood, common ninebark, arrowwood, nannyberry viburnum.	Northern whitecedar, white spruce, Manchurian crabapple.	Green ash, Norway spruce, eastern white pine.	---
Pc----- Pickford	Lilac, northern whitecedar, American cranberrybush, common ninebark, nannyberry viburnum, silky dogwood.	White spruce, Manchurian crabapple, red maple, eastern white pine, Norway spruce.	Green ash-----	---
PfA----- Algonquin	Lilac, Roselow sargent crabapple, silky dogwood, American cranberrybush, Amur maple, Siberian peashrub.	White spruce, blue spruce, Manchurian crabapple.	Norway spruce, eastern white pine, green ash.	---
PkA*: Algonquin-----	Lilac, Roselow sargent crabapple, silky dogwood, American cranberrybush, Amur maple, Siberian peashrub.	White spruce, blue spruce, Manchurian crabapple.	Norway spruce, eastern white pine, green ash.	---
Pickford-----	Lilac, northern whitecedar, American cranberrybush, common ninebark, nannyberry viburnum, silky dogwood.	White spruce, Manchurian crabapple, red maple, eastern white pine, Norway spruce.	Green ash-----	---
Rc. Roscommon				
RkB*: Roscommon.				
Kalkaska-----	Lilac, silver buffaloberry, smooth sumac, eastern redcedar, Siberian peashrub, staghorn sumac.	Red pine, jack pine, eastern white pine.	---	---
RoB, RoD, RoE----- Rousseau	Siberian crabapple, silky dogwood, Amur privet.	White spruce, eastern redcedar.	Red pine, eastern white pine, jack pine, Norway spruce.	Imperial Carolina poplar.
RuB, RuD, RuE----- Rubicon	Eastern redcedar, smooth sumac, silver buffaloberry, lilac, Siberian peashrub, staghorn sumac.	Red pine, eastern white pine, jack pine.	---	---

See footnote at end of table.

TABLE 6.--WINDBREAKS AND ENVIRONMENTAL PLANTINGS--Continued

Soil name and map symbol	Trees having predicted 20-year average height, in feet, of--			
	8-15	16-25	26-35	>35
Rv. Ruse				
ScA----- Finch	Northern whitecedar, silky dogwood, American cranberrybush, common ninebark, nannyberry viburnum, Amur maple.	Jack pine, Siberian crabapple.	White spruce, Norway spruce, eastern white pine, green ash.	---
ShB. Sheldrake				
SkB----- Skanee	Nannyberry viburnum, silky dogwood, American cranberrybush, northern whitecedar, lilac, Roselow sargent crabapple.	White spruce, Norway spruce, Siberian crabapple.	Eastern white pine, red maple, green ash.	---
StB, StD----- Steuben	Silky dogwood, American cranberrybush, Amur maple, lilac, arrowwood.	White spruce, Austrian pine, Siberian crabapple, red pine, eastern white pine, Norway spruce.	Green ash-----	---
SuA. Summerville				
SvA. Sundell				
SwA. Sundell variant				
Ta----- Tawas	Black spruce, silky dogwood, nannyberry viburnum, common ninebark, redosier dogwood, arrowwood.	Northern whitecedar, green ash.	---	---
TrA----- Trenary	Northern whitecedar, arrowwood, eastern redcedar, common ninebark, silky dogwood.	White spruce, red maple, Siberian crabapple, Norway spruce.	Eastern white pine, red pine.	Imperial Carolina poplar.
TrB, TrC, TrD----- Trenary	Northern whitecedar, arrowwood, common ninebark, silky dogwood, eastern redcedar.	White spruce, Siberian crabapple, Norway spruce, red maple.	Eastern white pine, red pine.	Imperial Carolina poplar.
WaA----- Wainola	Northern whitecedar, common ninebark, lilac, nannyberry viburnum, American cranberrybush, Amur privet.	White spruce, jack pine, Manchurian crabapple.	Norway spruce, eastern white pine.	---

See footnote at end of table.

TABLE 6.--WINDBREAKS AND ENVIRONMENTAL PLANTINGS--Continued

Soil name and map symbol	Trees having predicted 20-year average height, in feet, of--			
	8-15	16-25	26-35	>35
W1B, W1D----- Wallace	Siberian peashrub, northern whitecedar, Amur privet, lilac, silky dogwood, nannyberry viburnum, common ninebark.	Red pine, Siberian crabapple, white spruce.	Eastern white pine, green ash.	---
Wm. Wheatley				
YaB, YaD----- Yalmer	Silky dogwood, Amur maple, gray dogwood, American cranberrybush, nannyberry viburnum, Siberian peashrub.	White spruce, Norway spruce, Siberian crabapple, red pine.	Eastern white pine----	---

* See description of the map unit for composition and behavior characteristics of the map unit.

TABLE 7.--RECREATIONAL DEVELOPMENT

(Some terms that describe restrictive soil features are defined in the "Glossary." See text for definitions of "slight," "moderate," and "severe." Absence of an entry indicates that the soil was not rated)

Soil name and map symbol	Camp areas	Picnic areas	Playgrounds	Paths and trails
Ad*----- Alluvial land	Severe: flooding, ponding.	Severe: ponding.	Severe: ponding, flooding.	Severe: ponding.
AlC----- Alpena	Moderate: small stones.	Moderate: small stones.	Severe: slope, small stones.	Slight.
AuB----- Au Gres	Severe: wetness, too sandy.	Severe: wetness, too sandy.	Severe: . too sandy, wetness.	Severe: wetness, too sandy.
AvA----- Battlefield	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.
B1B----- Blue Lake	Severe: too sandy.	Severe: too sandy.	Severe: too sandy.	Severe: too sandy.
B1D----- Blue Lake	Severe: too sandy.	Severe: too sandy.	Severe: slope, too sandy.	Severe: too sandy.
B1E----- Blue Lake	Severe: slope, too sandy.	Severe: slope, too sandy.	Severe: slope, too sandy.	Severe: too sandy, slope.
BoB----- Bohemian	Moderate: percs slowly.	Moderate: percs slowly.	Moderate: slope, percs slowly.	Slight.
BoD----- Bohemian	Moderate: slope, percs slowly.	Moderate: slope, percs slowly.	Severe: slope.	Slight.
Bp*. Borrow pits				
BrA----- Bowers	Severe: wetness.	Moderate: wetness.	Severe: wetness.	Moderate: wetness.
Bs----- Brevort	Severe: ponding.	Severe: ponding.	Severe: ponding.	Severe: ponding.
BtA----- Brimley	Severe: wetness.	Moderate: wetness, percs slowly.	Severe: wetness.	Moderate: wetness.
Bu----- Bruce variant	Severe: ponding.	Severe: ponding.	Severe: ponding.	Severe: ponding.
BwC----- Burt	Severe: ponding, depth to rock.	Severe: ponding, depth to rock.	Severe: ponding, depth to rock.	Severe: ponding.

See footnote at end of table.

TABLE 7.--RECREATIONAL DEVELOPMENT--Continued

Soil name and map symbol	Camp areas	Picnic areas	Playgrounds	Paths and trails
Cb*: Carbondale-----	Severe: ponding, excess humus.	Severe: ponding, excess humus.	Severe: excess humus, ponding.	Severe: ponding, excess humus.
Lupton-----	Severe: ponding, excess humus.	Severe: ponding, excess humus.	Severe: excess humus, ponding.	Severe: ponding, excess humus.
Rifle-----	Severe: ponding, excess humus.	Severe: ponding, excess humus.	Severe: excess humus, ponding.	Severe: ponding, excess humus.
Ch----- Cathro	Severe: ponding, excess humus.	Severe: ponding, excess humus.	Severe: excess humus, ponding.	Severe: ponding, excess humus.
Ck*: Cathro-----	Severe: ponding, excess humus.	Severe: ponding, excess humus.	Severe: excess humus, ponding.	Severe: ponding, excess humus.
Tacoosh-----	Severe: ponding, excess humus.	Severe: ponding, excess humus.	Severe: excess humus, ponding.	Severe: ponding, excess humus.
ClA----- Charlevoix	Severe: wetness.	Moderate: wetness.	Severe: wetness.	Moderate: wetness.
CmA----- Chatham	Slight-----	Slight-----	Moderate: small stones.	Slight.
CmB----- Chatham	Slight-----	Slight-----	Moderate: slope, small stones.	Slight.
CmD----- Chatham	Moderate: slope.	Moderate: slope.	Severe: slope.	Slight.
Cn----- Chippeny	Severe: ponding, excess humus.	Severe: ponding, excess humus.	Severe: excess humus, ponding.	Severe: ponding, excess humus.
CrA----- Croswell	Severe: too sandy.	Severe: too sandy.	Severe: too sandy.	Severe: too sandy.
Da----- Dawson	Severe: ponding, excess humus.	Severe: ponding, excess humus.	Severe: excess humus, ponding.	Severe: ponding, excess humus.
Dd*: Dawson-----	Severe: ponding, excess humus.	Severe: ponding, excess humus.	Severe: excess humus, ponding.	Severe: ponding, excess humus.
Greenwood-----	Severe: ponding, excess humus.	Severe: ponding, excess humus.	Severe: excess humus, ponding.	Severe: ponding, excess humus.
DeB----- Deerton	Severe: too sandy.	Severe: too sandy.	Severe: too sandy.	Severe: too sandy.

See footnote at end of table.

TABLE 7.--RECREATIONAL DEVELOPMENT--Continued

Soil name and map symbol	Camp areas	Picnic areas	Playgrounds	Paths and trails
DeD----- Deerton	Severe: too sandy.	Severe: too sandy.	Severe: slope, too sandy.	Severe: too sandy.
DlB*: Deerton-----	Severe: too sandy.	Severe: too sandy.	Severe: too sandy.	Severe: too sandy.
Burt-----	Severe: ponding, depth to rock.	Severe: ponding, depth to rock.	Severe: ponding, depth to rock.	Severe: ponding.
Dm----- Deford	Severe: ponding.	Severe: ponding.	Severe: ponding.	Severe: ponding.
DuB----- Duel	Moderate: too sandy.	Moderate: too sandy.	Moderate: slope, too sandy.	Moderate: too sandy.
EaB----- Springlake	Severe: too sandy.	Severe: too sandy.	Severe: too sandy.	Severe: too sandy.
EcB----- Adams	Slight-----	Slight-----	Moderate: slope.	Slight.
EcD----- Adams	Moderate: slope.	Moderate: slope.	Severe: slope.	Slight.
EdB----- Eastport	Severe: too sandy.	Severe: too sandy.	Severe: too sandy.	Severe: too sandy.
EeB*: Eastport-----	Severe: too sandy.	Severe: too sandy.	Severe: too sandy.	Severe: too sandy.
Roscommon-----	Severe: ponding, too sandy.	Severe: ponding, too sandy.	Severe: too sandy, ponding.	Severe: ponding, too sandy.
EmA----- Emmet	Slight-----	Slight-----	Moderate: small stones.	Slight.
EmB----- Emmet	Slight-----	Slight-----	Moderate: slope, small stones.	Slight.
EmC----- Emmet	Moderate: slope.	Moderate: slope.	Severe: slope.	Slight.
EnA----- Ensign	Severe: wetness, depth to rock.	Severe: wetness, depth to rock.	Severe: wetness, depth to rock.	Severe: wetness.
Es*: Ensley-----	Severe: ponding.	Severe: ponding.	Severe: ponding.	Severe: ponding.
Angelica-----	Severe: ponding.	Severe: ponding.	Severe: ponding.	Severe: ponding.

See footnote at end of table.

TABLE 7.--RECREATIONAL DEVELOPMENT--Continued

Soil name and map symbol	Camp areas	Picnic areas	Playgrounds	Paths and trails
FaA----- Fairport	Slight-----	Slight-----	Moderate: small stones.	Slight.
FaB----- Fairport	Slight-----	Slight-----	Moderate: slope, small stones, depth to rock.	Slight.
GcB----- Gilchrist	Severe: too sandy.	Severe: too sandy.	Severe: too sandy.	Severe: too sandy.
GrB----- Grayling	Severe: too sandy.	Severe: too sandy.	Severe: too sandy.	Severe: too sandy.
GrD----- Grayling	Severe: too sandy.	Severe: too sandy.	Severe: slope, too sandy.	Severe: too sandy.
Gw----- Greenwood	Severe: ponding, excess humus.	Severe: ponding, excess humus.	Severe: excess humus, ponding.	Severe: ponding, excess humus.
IoB----- Iosco	Severe: wetness, too sandy.	Severe: wetness, too sandy.	Severe: too sandy, wetness.	Severe: wetness, too sandy.
KaB----- Kalkaska	Severe: too sandy.	Severe: too sandy.	Severe: too sandy.	Severe: too sandy.
KaD----- Kalkaska	Severe: too sandy.	Severe: too sandy.	Severe: slope, too sandy.	Severe: too sandy.
KaE----- Kalkaska	Severe: slope, too sandy.	Severe: slope, too sandy.	Severe: slope, too sandy.	Severe: too sandy, slope.
KdB----- Karlin	Slight-----	Slight-----	Moderate: slope, small stones.	Slight.
KdD----- Karlin	Moderate: slope.	Moderate: slope.	Severe: slope.	Slight.
KgC----- Kawbawgam	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.
KlA----- Kawkawlin	Severe: wetness.	Moderate: wetness.	Severe: wetness.	Moderate: wetness.
KnB----- Keweenaw	Slight-----	Slight-----	Moderate: slope, small stones.	Slight.
KnD----- Keweenaw	Moderate: slope.	Moderate: slope.	Severe: slope.	Slight.
Kr----- Kinross	Severe: ponding, too sandy.	Severe: ponding, too sandy.	Severe: too sandy, ponding.	Severe: ponding, too sandy.

See footnote at end of table.

TABLE 7.--RECREATIONAL DEVELOPMENT--Continued

Soil name and map symbol	Camp areas	Picnic areas	Playgrounds	Paths and trails
KsB----- Kiva	Slight-----	Slight-----	Moderate: slope, small stones.	Slight.
KsD----- Kiva	Moderate: slope.	Moderate: slope.	Severe: slope.	Slight.
Lb*. Lake beaches				
Lm*. Limestone rock land				
LoA----- Longrie	Slight-----	Slight-----	Moderate: small stones.	Slight.
LoB----- Longrie	Slight-----	Slight-----	Moderate: slope, small stones, depth to rock.	Slight.
LaD*: Longrie-----	Moderate: slope.	Moderate: slope.	Severe: slope.	Slight.
Summerville-----	Severe: depth to rock.	Severe: depth to rock.	Severe: slope, depth to rock.	Slight.
Ma*. Made land				
McB----- Mancelona	Slight-----	Slight-----	Moderate: slope, small stones.	Slight.
McD----- Mancelona	Moderate: slope.	Moderate: slope.	Severe: slope.	Slight.
Mh*. Marsh				
MlB----- Melita	Severe: too sandy.	Severe: too sandy.	Severe: too sandy.	Severe: too sandy.
MnB----- Menominee	Moderate: too sandy.	Moderate: too sandy.	Severe: small stones.	Moderate: too sandy.
MnD----- Menominee	Moderate: slope.	Moderate: slope, too sandy.	Severe: slope, small stones.	Moderate: too sandy.
MuB----- Munising	Severe: wetness.	Moderate: wetness, percs slowly.	Severe: wetness, percs slowly.	Moderate: wetness.
MuD----- Munising	Severe: wetness.	Moderate: slope, wetness, percs slowly.	Severe: slope, wetness, percs slowly.	Moderate: wetness.

See footnote at end of table.

TABLE 7.--RECREATIONAL DEVELOPMENT--Continued

Soil name and map symbol	Camp areas	Picnic areas	Playgrounds	Paths and trails
MuE----- Munising	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
Nh----- Nahma	Severe: ponding, excess humus.	Severe: ponding, excess humus.	Severe: excess humus, ponding.	Severe: ponding, excess humus.
NsA----- Nester	Slight-----	Slight-----	Moderate: small stones.	Slight.
NsB----- Nester	Slight-----	Slight-----	Moderate: slope, small stones.	Slight.
OnA----- Onaway	Slight-----	Slight-----	Moderate: small stones.	Slight.
OnB----- Onaway	Slight-----	Slight-----	Moderate: slope, small stones.	Slight.
OnC----- Onaway	Moderate: slope.	Moderate: slope.	Severe: slope.	Slight.
OnD----- Onaway	Severe: slope.	Severe: slope.	Severe: slope.	Moderate: slope.
OoE*: Onota-----	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
Chippeny-----	Severe: ponding, excess humus.	Severe: ponding, excess humus.	Severe: excess humus, ponding.	Severe: ponding, excess humus.
OrB*: Onota-----	Slight-----	Slight-----	Moderate: slope, depth to rock.	Slight.
Deerton-----	Moderate: too sandy.	Moderate: too sandy.	Moderate: slope, too sandy.	Moderate: too sandy.
OrD*: Onota-----	Moderate: slope.	Moderate: slope.	Severe: slope.	Slight.
Deerton-----	Moderate: slope, too sandy.	Moderate: slope, too sandy.	Severe: slope.	Moderate: too sandy.
OtB----- Otisco	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.
Pc----- Pickford	Severe: ponding, percs slowly.	Severe: ponding, percs slowly.	Severe: ponding, percs slowly.	Severe: ponding.
PfA----- Algonquin	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.

See footnote at end of table.

TABLE 7.--RECREATIONAL DEVELOPMENT--Continued

Soil name and map symbol	Camp areas	Picnic areas	Playgrounds	Paths and trails
PkA*:				
Algonquin-----	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.
Pickford-----	Severe: ponding, percs slowly.	Severe: ponding, percs slowly.	Severe: ponding, percs slowly.	Severe: ponding.
Rc-----	Severe: Roscommon ponding, too sandy.	Severe: ponding, too sandy.	Severe: too sandy, ponding.	Severe: ponding, too sandy.
RkB*:				
Roscommon-----	Severe: ponding, too sandy.	Severe: ponding, too sandy.	Severe: too sandy, ponding.	Severe: ponding, too sandy.
Kalkaska-----	Severe: too sandy.	Severe: too sandy.	Severe: too sandy.	Severe: too sandy.
RoB-----	Severe: Rousseau too sandy.	Severe: too sandy.	Severe: too sandy.	Severe: too sandy.
RoD-----	Severe: Rousseau too sandy.	Severe: too sandy.	Severe: slope, too sandy.	Severe: too sandy.
ReD-----	Severe: Rousseau slope, too sandy.	Severe: slope, too sandy.	Severe: slope, too sandy.	Severe: too sandy.
RuB-----	Severe: Rubicon too sandy.	Severe: too sandy.	Severe: too sandy.	Severe: too sandy.
RuD-----	Severe: Rubicon too sandy.	Severe: too sandy.	Severe: slope, too sandy.	Severe: too sandy.
RuE-----	Severe: Rubicon slope, too sandy.	Severe: slope, too sandy.	Severe: slope, too sandy.	Severe: too sandy, slope.
Rv-----	Severe: Ruse ponding, depth to rock	Severe: ponding, depth to rock.	Severe: ponding, depth to rock.	Severe: ponding.
ScA-----	Severe: Finch wetness, too sandy, cemented pan.	Severe: wetness, too sandy, cemented pan.	Severe: too sandy, wetness, cemented pan.	Severe: wetness, too sandy.
ShB-----	Severe: Shelldrake too sandy.	Severe: too sandy.	Severe: too sandy.	Severe: too sandy.
SkB-----	Severe: Skaneee wetness, percs slowly.	Severe: wetness, percs slowly.	Severe: wetness, percs slowly.	Severe: wetness.
StB-----	Severe: Steuben wetness.	Moderate: wetness, percs slowly.	Severe: wetness.	Moderate: wetness.

See footnote at end of table.

TABLE 7.--RECREATIONAL DEVELOPMENT--Continued

Soil name and map symbol	Camp areas	Picnic areas	Playgrounds	Paths and trails
StD----- Steuben	Severe: wetness.	Moderate: slope, wetness, percs slowly.	Severe: slope, wetness.	Moderate: wetness.
SuA----- Summerville	Severe: depth to rock.	Severe: depth to rock.	Severe: depth to rock.	Slight.
SvA----- Sundell	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.
SwA----- Sundell variant	Severe: wetness.	Moderate: wetness, too sandy.	Severe: wetness.	Moderate: wetness, too sandy.
Ta----- Tawas	Severe: ponding, excess humus.	Severe: ponding, excess humus.	Severe: excess humus, ponding.	Severe: ponding, excess humus.
TrA----- Trenary	Slight-----	Slight-----	Moderate: small stones.	Slight.
TrB----- Trenary	Slight-----	Slight-----	Moderate: slope, small stones.	Slight.
TrC----- Trenary	Moderate: slope.	Moderate: slope.	Severe: slope.	Slight.
TrD----- Trenary	Severe: slope.	Severe: slope.	Severe: slope.	Moderate: slope.
WaA----- Wainola	Severe: wetness, too sandy.	Severe: wetness, too sandy.	Severe: too sandy, wetness.	Severe: wetness, too sandy.
WlB----- Wallace	Severe: too sandy, cemented pan.	Severe: too sandy, cemented pan.	Severe: too sandy, cemented pan.	Severe: too sandy.
WlD----- Wallace	Severe: too sandy, cemented pan.	Severe: too sandy, cemented pan.	Severe: slope, too sandy, cemented pan.	Severe: too sandy.
Wm----- Wheatley	Severe: ponding.	Severe: ponding.	Severe: ponding.	Severe: ponding.
YaB----- Yalmer	Severe: percs slowly, too sandy.	Severe: too sandy, percs slowly.	Severe: too sandy, percs slowly.	Severe: too sandy.
YaD----- Yalmer	Severe: percs slowly, too sandy.	Severe: too sandy, percs slowly.	Severe: slope, too sandy, percs slowly.	Severe: too sandy.

* See description of the map unit for composition and behavior characteristics of the map unit.

TABLE 8.--WILDLIFE HABITAT

(See text for definitions of "good," "fair," "poor," and "very poor." Absence of an entry indicates that the soil was not rated)

Soil name and map symbol	Potential for habitat elements							Potential as habitat for--		
	Grain and seed crops	Grasses and legumes	Wild herba-ceous plants	Hardwood trees	Coniferous plants	Wetland plants	Shallow water areas	Openland wildlife	Woodland wildlife	Wetland wildlife
Ad*. Alluvial land										
AlC----- Alpena	Poor	Poor	Poor	Fair	Fair	Very poor.	Very poor.	Poor	Fair	Very poor.
AuB----- Au Gres	Poor	Fair	Good	Good	Good	Poor	Poor	Fair	Good	Poor.
AvA----- Battlefield	Fair	Fair	Good	Fair	Fair	Fair	Poor	Fair	Fair	Poor.
BlB----- Blue Lake	Fair	Fair	Good	Good	Good	Very poor.	Very poor.	Fair	Good	Very poor.
BlD----- Blue Lake	Poor	Fair	Good	Good	Good	Very poor.	Very poor.	Fair	Good	Very poor.
BlE----- Blue Lake	Very poor.	Poor	Good	Good	Good	Very poor.	Very poor.	Poor	Good	Very poor.
BoB----- Bohemian	Good	Good	Good	Good	Good	Poor	Very poor.	Good	Good	Very poor.
BoD----- Bohemian	Fair	Good	Good	Good	Good	Very poor.	Very poor.	Good	Good	Very poor.
Bp*. Borrow pits										
BrA----- Bowers	Good	Good	Good	Good	Good	Poor	Very poor.	Good	Good	Very poor.
Bs----- Brevort	Poor	Fair	Fair	Fair	Fair	Good	Good	Fair	Fair	Good.
BtA----- Brimley	Fair	Good	Good	Good	Good	Poor	Poor	Good	Good	Poor.
Bu----- Bruce variant	Poor	Poor	Fair	Fair	Fair	Good	Good	Poor	Fair	Good.
BwC----- Burt	Very poor.	Poor	Poor	Very poor.	Very poor.	Fair	Poor	Very poor.	Very poor.	Poor.
Cb*: Carbondale-----	Fair	Poor	Poor	Poor	Poor	Good	Good	Poor	Poor	Good.
Lupton-----	Poor	Poor	Poor	Poor	Poor	Good	Good	Poor	Poor	Good.
Rifle-----	Very poor.	Poor	Poor	Poor	Poor	Good	Good	Poor	Poor	Good.
Ch----- Cathro	Poor	Poor	Poor	Poor	Poor	Good	Good	Poor	Poor	Good.

See footnote at end of table.

TABLE 8.--WILDLIFE HABITAT--Continued

Soil name and map symbol	Potential for habitat elements							Potential as habitat for--		
	Grain and seed crops	Grasses and legumes	Wild herba-ceous plants	Hardwood trees	Coniferous plants	Wetland plants	Shallow water areas	Openland wildlife	Woodland wildlife	Wetland wildlife
Ck*: Cathro-----	Poor	Poor	Poor	Poor	Poor	Good	Good	Poor	Poor	Good.
Tacoosh-----	Poor	Poor	Poor	Poor	Poor	Good	Good	Poor	Poor	Good.
ClA----- Charlevoix	Fair	Good	Good	Good	Good	Poor	Very poor.	Good	Good	Very poor.
CmA, CmB----- Chatham	Good	Good	Good	Good	Good	Poor	Very poor.	Good	Good	Very poor.
CmD----- Chatham	Fair	Good	Good	Good	Good	Very poor.	Very poor.	Good	Good	Very poor.
Cn----- Chippeny	Very poor.	Poor	Poor	Poor	Poor	Good	Fair	Poor	Poor	Fair.
CrA----- Croswell	Poor	Poor	Fair	Fair	Fair	Poor	Very poor.	Poor	Fair	Very poor.
Da----- Dawson	Very poor.	Poor	Poor	Poor	Poor	Poor	Good	Poor	Poor	Fair.
Dd*: Dawson-----	Very poor.	Poor	Poor	Poor	Poor	Poor	Good	Poor	Poor	Fair.
Greenwood-----	Very poor.	Poor	Poor	Poor	Poor	Good	Good	Poor	Poor	Good.
DeB----- Deerton	Poor	Poor	Fair	Good	Good	Very poor.	Very poor.	Poor	Good	Very poor.
DeD----- Deerton	Very poor.	Poor	Fair	Good	Good	Very poor.	Very poor.	Poor	Good	Very poor.
DLB*: Deerton-----	Poor	Poor	Fair	Good	Good	Very poor.	Very poor.	Poor	Good	Very poor.
Burt-----	Very poor.	Poor	Poor	Very poor.	Very poor.	Fair	Poor	Very poor.	Very poor.	Poor.
Dm----- Deford	Fair	Fair	Fair	Fair	Fair	Good	Good	Fair	Fair	Good.
DuB----- Duel	Fair	Fair	Good	Good	Good	Very poor.	Very poor.	Fair	Good	Very poor.
EaB----- Springlake	Fair	Good	Good	Good	Good	Poor	Very poor.	Good	Good	Very poor.
EcB, EcD----- Adams	Poor	Fair	Fair	Poor	Poor	Very poor.	Very poor.	Poor	Poor	Very poor.
EdB----- Eastport	Poor	Poor	Fair	Fair	Fair	Very poor.	Very poor.	Poor	Fair	Very poor.

See footnote at end of table.

TABLE 8.--WILDLIFE HABITAT--Continued

Soil name and map symbol	Potential for habitat elements							Potential as habitat for--		
	Grain and seed crops	Grasses and legumes	Wild herba-ceous plants	Hardwood trees	Coniferous plants	Wetland plants	Shallow water areas	Openland wildlife	Woodland wildlife	Wetland wildlife
EeB*: Eastport-----	Poor	Poor	Fair	Fair	Fair	Very poor.	Very poor.	Poor	Fair	Very poor.
Roscommon-----	Poor	Poor	Poor	Fair	Fair	Good	Good	Poor	Fair	Good.
EmA, EmB----- Emmet	Good	Good	Good	Good	Good	Poor	Very poor.	Good	Good	Very poor.
EmC----- Emmet	Fair	Good	Good	Good	Good	Very poor.	Very poor.	Good	Good	Very poor.
EnA----- Ensign	Poor	Poor	Fair	Fair	Fair	Fair	Poor	Poor	Fair	Poor.
Eg*: Ensley-----	Fair	Fair	Fair	Fair	Fair	Good	Good	Fair	Fair	Good.
Angelica-----	Good	Fair	Fair	Fair	Fair	Good	Good	Fair	Fair	Good.
FaA, FaB----- Fairport	Fair	Good	Good	Good	Good	Poor	Very poor.	Good	Good	Very poor.
GcB----- Gilchrist	Fair	Fair	Good	Good	Good	Poor	Very poor.	Good	Good	Very poor.
GrB----- Grayling	Poor	Poor	Fair	Poor	Poor	Poor	Very poor.	Poor	Poor	Very poor.
GrD----- Grayling	Poor	Poor	Fair	Poor	Poor	Very poor.	Very poor.	Poor	Poor	Very poor.
Gw----- Greenwood	Very poor.	Poor	Poor	Poor	Poor	Good	Good	Poor	Poor	Good.
IoB----- Iosco	Fair	Fair	Good	Good	Good	Fair	Fair	Fair	Good	Fair.
KaB----- Kalkaska	Fair	Fair	Fair	Good	Good	Very poor.	Very poor.	Fair	Good	Very poor.
KaD----- Kalkaska	Poor	Fair	Fair	Good	Good	Very poor.	Very poor.	Fair	Good	Very poor.
KaE----- Kalkaska	Very poor.	Poor	Fair	Good	Good	Very poor.	Very poor.	Poor	Good	Very poor.
KdB, KdD----- Karlin	Fair	Fair	Good	Good	Good	Very poor.	Very poor.	Fair	Good	Very poor.
KgC----- Kawbawgam	Poor	Fair	Fair	Fair	Fair	Poor	Very poor.	Poor	Fair	Very poor.
KlA----- Kawkaulin	Fair	Good	Good	Good	Good	Fair	Fair	Good	Good	Fair.
KnB----- Keweenaw	Fair	Fair	Good	Good	Good	Poor	Very poor.	Fair	Good	Very poor.

See footnote at end of table.

TABLE 8.--WILDLIFE HABITAT--Continued

Soil name and map symbol	Potential for habitat elements							Potential as habitat for--		
	Grain and seed crops	Grasses and legumes	Wild herba-ceous plants	Hardwood trees	Coniferous plants	Wetland plants	Shallow water areas	Openland wildlife	Woodland wildlife	Wetland wildlife
KnD----- Keweenaw	Fair	Fair	Good	Good	Good	Very poor.	Very poor.	Fair	Good	Very poor.
Kr----- Kinross	Very poor.	Poor	Poor	Fair	Fair	Good	Good	Very poor.	Fair	Good.
KsB----- Kiva	Fair	Good	Good	Good	Good	Poor	Very poor.	Good	Good	Very poor.
KsD----- Kiva	Fair	Good	Good	Good	Good	Very poor.	Very poor.	Good	Good	Very poor.
Lb*. Lake beaches										
Lm*. Limestone rock land										
LoA, LoB----- Longrie	Good	Good	Good	Good	Good	Poor	Very poor.	Good	Good	Very poor.
LsD*: Longrie-----	Good	Good	Good	Good	Good	Very poor.	Very poor.	Good	Good	Very poor.
Summerville-----	Very poor.	Poor	Fair	Good	Good	Very poor.	Very poor.	Poor	Good	Very poor.
Ma*. Made land										
McB, McD----- Mancelona	Fair	Fair	Good	Good	Good	Very poor.	Very poor.	Fair	Good	Very poor.
Mh*. Marsh										
MLB----- Melita	Fair	Fair	Good	Good	Good	Very poor.	Very poor.	Fair	Good	Very poor.
MnB, MnD----- Menominee	Fair	Fair	Good	Good	Good	Very poor.	Very poor.	Fair	Good	Very poor.
MuB----- Munising	Good	Good	Good	Fair	Fair	Poor	Poor	Good	Fair	Poor.
MuD----- Munising	Fair	Good	Good	Fair	Fair	Very poor.	Very poor.	Good	Fair	Very poor.
MuE----- Munising	Very poor.	Poor	Good	Good	Good	Very poor.	Very poor.	Poor	Good	Very poor.
Nh----- Nahma	Very poor.	Fair	Fair	Fair	Fair	Good	Good	Poor	Fair	Fair.
NsA, NsB----- Nester	Good	Good	Good	Good	Good	Poor	Very poor.	Good	Good	Very poor.

See footnote at end of table.

TABLE 8.--WILDLIFE HABITAT--Continued

Soil name and map symbol	Potential for habitat elements							Potential as habitat for--		
	Grain and seed crops	Grasses and legumes	Wild herba- cecus plants	Hardwood trees	Conif- erous plants	Wetland plants	Shallow water areas	Openland wildlife	Woodland wildlife	Wetland wildlife
OnA, OnB----- Onaway	Good	Good	Good	Good	Good	Poor	Very poor.	Good	Good	Very poor.
OnC----- Onaway	Fair	Good	Good	Good	Good	Very poor.	Very poor.	Good	Good	Very poor.
OnD----- Onaway	Poor	Fair	Good	Good	Good	Very poor.	Very poor.	Good	Good	Very poor.
OoE*: Onota-----	Very poor.	Fair	Good	Good	Good	Very poor.	Very poor.	Fair	Good	Very poor.
Chippeny-----	Very poor.	Poor	Poor	Poor	Poor	Good	Fair	Poor	Poor	Fair.
OrB*: Onota-----	Good	Good	Good	Good	Good	Poor	Very poor.	Good	Good	Very poor.
Deerton-----	Poor	Poor	Fair	Good	Good	Very poor.	Very poor.	Poor	Good	Very poor.
OrD*: Onota-----	Fair	Good	Good	Good	Good	Very poor.	Very poor.	Good	Good	Very poor.
Deerton-----	Very poor.	Poor	Fair	Good	Good	Very poor.	Very poor.	Poor	Good	Very poor.
OtB----- Otisco	Fair	Good	Good	Fair	Good	Poor	Very poor.	Good	Fair	Very poor.
Pc----- Pickford	Poor	Poor	Fair	Fair	Fair	Good	Good	Poor	Fair	Good.
PfA----- Algonquin	Fair	Good	Good	Good	Good	Good	Fair	Good	Good	Fair.
PkA*: Algonquin-----	Good	Good	Good	Good	Good	Fair	Poor	Good	Good	Poor.
Pickford-----	Poor	Poor	Fair	Fair	Fair	Good	Good	Poor	Fair	Good.
Rc----- Roscommon	Poor	Poor	Poor	Fair	Fair	Good	Good	Poor	Fair	Good.
RkB*: Roscommon-----	Poor	Poor	Poor	Fair	Fair	Good	Good	Poor	Fair	Good.
Kalkaska-----	Fair	Fair	Fair	Good	Good	Very poor.	Very poor.	Fair	Good	Very poor.
RoB----- Rousseau	Fair	Fair	Good	Good	Good	Poor	Very poor.	Fair	Good	Very poor.
RoD----- Rousseau	Fair	Fair	Good	Good	Good	Very poor.	Very poor.	Fair	Good	Very poor.

See footnote at end of table.

TABLE 8.--WILDLIFE HABITAT--Continued

Soil name and map symbol	Potential for habitat elements							Potential as habitat for--		
	Grain and seed crops	Grasses and legumes	Wild herba-ceous plants	Hardwood trees	Coniferous plants	Wetland plants	Shallow water areas	Openland wildlife	Woodland wildlife	Wetland wildlife
RsD-----Rousseau	Poor	Fair	Good	Good	Good	Very poor.	Very poor.	Fair	Good	Very poor.
RuB-----Rubicon	Poor	Poor	Fair	Fair	Fair	Poor	Very poor.	Poor	Fair	Very poor.
RuD-----Rubicon	Poor	Poor	Fair	Fair	Fair	Very poor.	Very poor.	Poor	Fair	Very poor.
RuE-----Rubicon	Very poor.	Poor	Fair	Fair	Fair	Very poor.	Very poor.	Poor	Fair	Very poor.
Rv-----Ruse	Poor	Poor	Fair	Poor	Fair	Good	Poor	Poor	Fair	Fair.
ScA-----Finch	Poor	Poor	Fair	Fair	Fair	Poor	Poor	Poor	Fair	Poor.
ShB-----Shelldrake	Poor	Poor	Fair	Poor	Poor	Poor	Very poor.	Poor	Poor	Very poor.
SkB-----Skaneee	Fair	Good	Good	Fair	Fair	Poor	Very poor.	Good	Fair	Very poor.
StB-----Steuben	Fair	Good	Good	Fair	Fair	Poor	Very poor.	Good	Fair	Very poor.
StD-----Steuben	Fair	Good	Good	Fair	Fair	Very poor.	Very poor.	Good	Fair	Very poor.
SuA-----Summerville	Fair	Fair	Fair	Good	Good	Poor	Very poor.	Fair	Good	Very poor.
SvA-----Sundell	Fair	Good	Good	Good	Good	Poor	Very poor.	Good	Good	Very poor.
SwA-----Sundell variant	Fair	Fair	Fair	Good	Good	Poor	Poor	Fair	Good	Poor.
Ta-----Tawas	Poor	Poor	Poor	Poor	Poor	Good	Good	Poor	Poor	Good.
TrA, TrB-----Trenary	Good	Good	Good	Good	Good	Poor	Very poor.	Good	Good	Very poor.
TrC-----Trenary	Fair	Good	Good	Good	Good	Very poor.	Very poor.	Good	Good	Very poor.
TrD-----Trenary	Poor	Fair	Good	Good	Good	Very poor.	Very poor.	Fair	Good	Very poor.
WaA-----Wainola	Fair	Fair	Fair	Good	Good	Poor	Poor	Fair	Good	Poor.
WlB-----Wallace	Poor	Poor	Fair	Fair	Fair	Poor	Very poor.	Poor	Fair	Very poor.
WlD-----Wallace	Poor	Poor	Fair	Fair	Fair	Very poor.	Very poor.	Poor	Fair	Very poor.

See footnote at end of table.

TABLE 8.--WILDLIFE HABITAT--Continued

Soil name and map symbol	Potential for habitat elements							Potential as habitat for--		
	Grain and seed crops	Grasses and legumes	Wild herba-ceous plants	Hardwood trees	Coniferous plants	Wetland plants	Shallow water areas	Openland wildlife	Woodland wildlife	Wetland wildlife
Wm----- Wheatley	Poor	Poor	Fair	Fair	Fair	Fair	Good	Poor	Fair	Fair.
YaB----- Yalmer	Fair	Fair	Fair	Good	Good	Poor	Very poor.	Fair	Good	Very poor.
YaD----- Yalmer	Fair	Fair	Fair	Good	Good	Very poor.	Very poor.	Fair	Good	Very poor.

* See description of the map unit for composition and behavior characteristics of the map unit.

TABLE 9.--BUILDING SITE DEVELOPMENT

(Some terms that describe restrictive soil features are defined in the "Glossary." See text for definitions of "slight," "moderate," and "severe." Absence of an entry indicates that the soil was not rated. The information in this table indicates the dominant soil condition but does not eliminate the need for onsite investigation)

Soil name and map symbol	Shallow excavations	Dwellings without basements	Dwellings with basements	Small commercial buildings	Local roads and streets	Lawns and landscaping
Ad*----- Alluvial land	Severe: ponding.	Severe: flooding, ponding.	Severe: flooding, ponding.	Severe: flooding, ponding.	Severe: ponding, flooding.	Severe: ponding, flooding.
AlC----- Alpena	Severe: cutbanks cave.	Slight-----	Slight-----	Moderate: slope.	Slight-----	Severe: droughty.
AuB----- Au Gres	Severe: cutbanks cave, wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.
AvA----- Battlefield	Severe: cutbanks cave, wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.
BlB----- Blue Lake	Severe: cutbanks cave.	Slight-----	Slight-----	Slight-----	Slight-----	Moderate: droughty, too sandy.
BlD----- Blue Lake	Severe: cutbanks cave.	Moderate: slope.	Moderate: slope.	Severe: slope.	Moderate: slope.	Moderate: droughty, slope, too sandy.
BlE----- Blue Lake	Severe: cutbanks cave, slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
BoB----- Bohemian	Severe: cutbanks cave.	Slight-----	Slight-----	Slight-----	Moderate: low strength, frost action.	Slight.
BoD----- Bohemian	Severe: cutbanks cave.	Moderate: slope.	Moderate: slope.	Severe: slope.	Moderate: low strength, slope, frost action.	Moderate: slope.
Bp*. Borrow pits						
BrA----- Bowers	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: low strength, frost action.	Moderate: wetness.
Bs----- Brevort	Severe: cutbanks cave, ponding.	Severe: ponding.	Severe: ponding.	Severe: ponding.	Severe: ponding.	Severe: ponding.
BtA----- Brimley	Severe: cutbanks cave, wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: frost action.	Moderate: wetness.
Bu----- Bruce variant	Severe: cutbanks cave, ponding.	Severe: ponding.	Severe: ponding.	Severe: ponding.	Severe: ponding, frost action.	Severe: ponding.

See footnote at end of table.

TABLE 9.--BUILDING SITE DEVELOPMENT--Continued

Soil name and map symbol	Shallow excavations	Dwellings without basements	Dwellings with basements	Small commercial buildings	Local roads and streets	Lawns and landscaping
BwC----- Burt	Severe: depth to rock, ponding. 	Severe: ponding, depth to rock. 	Severe: ponding, depth to rock. 	Severe: ponding, depth to rock. 	Severe: depth to rock, ponding. 	Severe: ponding, depth to rock.
Cb*: Carbondale-----	Severe: excess humus, ponding. 	Severe: subsides, ponding, low strength. 	Severe: subsides, ponding, low strength. 	Severe: subsides, ponding, low strength. 	Severe: subsides, ponding, frost action. 	Severe: ponding, excess humus.
Lupton-----	Severe: excess humus, ponding. 	Severe: subsides, ponding, low strength. 	Severe: subsides, ponding, low strength. 	Severe: subsides, ponding, low strength. 	Severe: subsides, ponding, frost action. 	Severe: ponding, excess humus.
Rifle-----	Severe: excess humus, ponding. 	Severe: ponding, low strength. 	Severe: ponding, low strength. 	Severe: ponding, low strength. 	Severe: ponding, frost action. 	Severe: ponding, excess humus.
Ch----- Cathro	Severe: excess humus, ponding. 	Severe: subsides, ponding. 	Severe: subsides, ponding. 	Severe: subsides, ponding. 	Severe: subsides, ponding, frost action. 	Severe: ponding, excess humus.
Ck*: Cathro-----	Severe: excess humus, ponding. 	Severe: subsides, ponding. 	Severe: subsides, ponding. 	Severe: subsides, ponding. 	Severe: subsides, ponding, frost action. 	Severe: ponding, excess humus.
Tacoosh-----	Severe: excess humus, ponding. 	Severe: ponding, low strength. 	Severe: ponding. 	Severe: ponding, low strength. 	Severe: ponding, frost action. 	Severe: ponding, excess humus.
ClA----- Charlevoix	Severe: wetness. 	Severe: wetness. 	Severe: wetness. 	Severe: wetness. 	Severe: frost action. 	Moderate: wetness, droughty.
CmA----- Chatham	Severe: cutbanks cave. 	Moderate: large stones. 	Moderate: large stones. 	Moderate: large stones. 	Moderate: frost action, large stones, large stones. 	Moderate: large stones, droughty.
CmB----- Chatham	Severe: cutbanks cave. 	Moderate: large stones. 	Moderate: large stones. 	Moderate: slope, large stones. 	Moderate: frost action, large stones, large stones. 	Moderate: large stones, droughty.
CmD----- Chatham	Severe: cutbanks cave. 	Moderate: slope, large stones. 	Moderate: slope, large stones. 	Severe: slope. 	Moderate: frost action, large stones, slope. 	Moderate: large stones, droughty, slope.
Cn----- Chippeny	Severe: depth to rock, cutbanks cave, ponding, ponding. 	Severe: subsides, ponding, low strength. 	Severe: subsides, ponding, depth to rock. 	Severe: subsides, ponding, low strength. 	Severe: subsides, ponding, frost action. 	Severe: ponding, excess humus.
CrA----- Croswell	Severe: cutbanks cave, wetness. 	Moderate: wetness. 	Severe: wetness. 	Moderate: wetness. 	Moderate: wetness. 	Moderate: droughty, too sandy.

See footnote at end of table.

TABLE 9.--BUILDING SITE DEVELOPMENT--Continued

Soil name and map symbol	Shallow excavations	Dwellings without basements	Dwellings with basements	Small commercial buildings	Local roads and streets	Lawns and landscaping
Dawson	Severe: cutbanks cave, excess humus, ponding.	Severe: subsides, ponding, low strength.	Severe: subsides, ponding.	Severe: subsides, ponding, low strength.	Severe: subsides, ponding, frost action.	Severe: ponding, excess humus.
Dd*: Dawson	Severe: cutbanks cave, excess humus, ponding.	Severe: subsides, ponding, low strength.	Severe: subsides, ponding.	Severe: subsides, ponding, low strength.	Severe: subsides, ponding, frost action.	Severe: ponding, excess humus.
Greenwood	Severe: excess humus, ponding.	Severe: ponding, low strength.	Severe: ponding, low strength.	Severe: ponding, low strength.	Severe: ponding, excess humus.	Severe: ponding, excess humus.
DeB: Deerton	Severe: depth to rock, cutbanks cave.	Moderate: depth to rock.	Severe: depth to rock.	Moderate: depth to rock.	Moderate: depth to rock.	Moderate: droughty, depth to rock.
DeD: Deerton	Severe: depth to rock, cutbanks cave.	Moderate: slope,	Severe: depth to rock.	Severe: slope.	Moderate: depth to rock, slope.	Moderate: droughty, depth to rock.
DLB*: Deerton	Severe: depth to rock, cutbanks cave.	Moderate: depth to rock.	Severe: depth to rock.	Moderate: depth to rock.	Moderate: depth to rock.	Moderate: droughty, depth to rock.
Burt	Severe: depth to rock, ponding.	Severe: depth to rock.	Severe: ponding, depth to rock.	Severe: ponding, depth to rock.	Severe: depth to rock, ponding.	Severe: ponding, depth to rock.
Dm: Deford	Severe: cutbanks cave, ponding.	Severe: ponding.	Severe: ponding.	Severe: ponding.	Severe: ponding.	Severe: ponding, droughty.
DuB: Duel	Severe: cutbanks cave.	Moderate: depth to rock.	Severe: depth to rock.	Moderate: depth to rock.	Moderate: depth to rock.	Moderate: droughty, depth to rock.
EaB: Springlake	Severe: cutbanks cave.	Slight-----	Slight-----	Slight-----	Slight-----	Severe: droughty.
EcB: Adams	Severe: cutbanks cave.	Slight-----	Slight-----	Slight-----	Slight-----	Severe: droughty.
EcD: Adams	Severe: cutbanks cave.	Moderate: slope.	Moderate: slope.	Severe: slope.	Moderate: slope.	Severe: droughty.
EdB: Eastport	Severe: cutbanks cave.	Slight-----	Slight-----	Slight-----	Slight-----	Moderate: droughty, too sandy.
EeB*: Eastport	Severe: cutbanks cave.	Slight-----	Slight-----	Slight-----	Slight-----	Moderate: droughty, too sandy.

See footnote at end of table.

TABLE 9.--BUILDING SITE DEVELOPMENT--Continued

Soil name and map symbol	Shallow excavations	Dwellings without basements	Dwellings with basements	Small commercial buildings	Local roads and streets	Lawns and landscaping
EeB*: Roscommon-----	Severe: cutbanks cave, ponding.	Severe: ponding.	Severe: ponding.	Severe: ponding.	Severe: ponding.	Severe: ponding.
EmA----- Emmet	Severe: cutbanks cave.	Slight-----	Slight-----	Slight-----	Moderate: frost action.	Moderate: large stones.
EmB----- Emmet	Severe: cutbanks cave.	Slight-----	Slight-----	Moderate: slope.	Moderate: frost action.	Moderate: large stones.
EmC----- Emmet	Severe: cutbanks cave.	Moderate: slope.	Moderate: slope.	Severe: slope.	Moderate: slope, frost action.	Moderate: large stones, slope.
EnA----- Ensign	Severe: depth to rock, wetness, wetness.	Severe: depth to rock.	Severe: depth to rock.	Severe: depth to rock.	Severe: depth to rock, wetness, frost action.	Severe: wetness, depth to rock.
Es*: Ensley-----	Severe: ponding.	Severe: ponding.	Severe: ponding.	Severe: ponding.	Severe: ponding, frost action.	Severe: ponding.
Angelica-----	Severe: ponding.	Severe: ponding.	Severe: ponding.	Severe: ponding.	Severe: ponding, frost action.	Severe: ponding.
FaA----- Fairport	Severe: depth to rock.	Moderate: shrink-swell, depth to rock.	Severe: depth to rock.	Moderate: shrink-swell, depth to rock.	Severe: low strength.	Moderate: depth to rock.
FaB----- Fairport	Severe: depth to rock.	Moderate: shrink-swell, depth to rock.	Severe: depth to rock.	Moderate: shrink-swell, slope, depth to rock.	Severe: low strength.	Moderate: depth to rock.
GcB----- Gilchrist	Severe: cutbanks cave.	Slight-----	Moderate: wetness.	Slight-----	Slight-----	Moderate: droughty, too sandy.
GrB----- Grayling	Severe: cutbanks cave.	Slight-----	Slight-----	Slight-----	Slight-----	Severe: droughty.
GrD----- Grayling	Severe: cutbanks cave.	Moderate: slope.	Moderate: slope.	Severe: slope.	Moderate: slope.	Severe: droughty.
Gw----- Greenwood	Severe: excess humus, ponding.	Severe: ponding, low strength.	Severe: ponding, low strength.	Severe: ponding, low strength.	Severe: ponding,	Severe: ponding, excess humus.
IoB----- Iosco	Severe: cutbanks cave, wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.
KaB----- Kalkaska	Severe: cutbanks cave.	Slight-----	Slight-----	Slight-----	Slight-----	Moderate: droughty, too sandy.

See footnote at end of table.

TABLE 9.--BUILDING SITE DEVELOPMENT--Continued

Soil name and map symbol	Shallow excavations	Dwellings without basements	Dwellings with basements	Small commercial buildings	Local roads and streets	Lawns and landscaping
KaD----- Kalkaska	Severe: cutbanks cave.	Moderate: slope.	Moderate: slope.	Severe: slope.	Moderate: slope.	Moderate: droughty, slope, too sandy.
KaE----- Kalkaska	Severe: cutbanks cave, slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
KdB----- Karlin	Severe: cutbanks cave.	Slight-----	Slight-----	Slight-----	Slight-----	Moderate: droughty.
KdD----- Karlin	Severe: cutbanks cave.	Moderate: slope.	Moderate: slope.	Severe: slope.	Moderate: slope.	Moderate: droughty, slope.
KgC----- Kawbawgam	Severe: depth to rock, wetness.	Severe: wetness.	Severe: wetness, depth to rock.	Severe: wetness.	Severe: wetness, frost action.	Severe: wetness.
KlA----- Kawkawlin	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: low strength, frost action.	Moderate: wetness.
KnB----- Keweenaw	Severe: cutbanks cave.	Slight-----	Slight-----	Slight-----	Slight-----	Moderate: large stones, droughty.
KnD----- Keweenaw	Severe: cutbanks cave.	Moderate: slope.	Moderate: slope.	Severe: slope.	Moderate: slope.	Moderate: large stones, droughty, slope.
Kr----- Kinross	Severe: cutbanks cave, ponding.	Severe: ponding.	Severe: ponding.	Severe: ponding.	Severe: ponding.	Severe: ponding.
KsB----- Kiva	Severe: cutbanks cave.	Slight-----	Slight-----	Slight-----	Slight-----	Moderate: large stones, droughty.
KsD----- Kiva	Severe: cutbanks cave.	Moderate: slope.	Moderate: slope.	Severe: slope.	Moderate: slope.	Moderate: large stones, droughty, slope.
Lb*. Lake beaches						
Lm*. Limestone rock land						
LoA----- Longrie	Severe: depth to rock.	Moderate: depth to rock.	Severe: depth to rock.	Moderate: depth to rock.	Moderate: depth to rock, frost action.	Moderate: large stones, droughty.
LoB----- Longrie	Severe: depth to rock.	Moderate: depth to rock.	Severe: depth to rock.	Moderate: slope,	Moderate: depth to rock, frost action.	Moderate: large stones, droughty.

See footnote at end of table.

TABLE 9.--BUILDING SITE DEVELOPMENT--Continued

Soil name and map symbol	Shallow excavations	Dwellings without basements	Dwellings with basements	Small commercial buildings	Local roads and streets	Lawns and landscaping
LsD*: Longrie-----	Severe: depth to rock.	Moderate: slope, depth to rock.	Severe: depth to rock.	Severe: slope.	Moderate: depth to rock, slope, frost action.	Moderate: large stones, droughty.
Summerville-----	Severe: depth to rock.	Severe: depth to rock.	Severe: depth to rock.	Severe: slope, depth to rock.	Severe: depth to rock.	Severe: depth to rock.
Ma*: Made land						
McB----- Mancelona	Severe: cutbanks cave.	Slight-----	Slight-----	Slight-----	Slight-----	Moderate: large stones, droughty.
McD----- Mancelona	Severe: cutbanks cave.	Moderate: slope.	Moderate: slope.	Severe: slope.	Moderate: slope.	Moderate: large stones, droughty, slope.
Mh*: Marsh						
MlB----- Melita	Severe: cutbanks cave.	Slight-----	Slight-----	Slight-----	Slight-----	Severe: droughty.
MnB----- Menominee	Severe: cutbanks cave.	Slight-----	Slight-----	Slight-----	Slight-----	Moderate: small stones.
MnD----- Menominee	Severe: cutbanks cave.	Moderate: slope.	Moderate: slope.	Severe: slope.	Moderate: slope.	Moderate: small stones, slope.
MuB----- Munising	Severe: cutbanks cave, wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Moderate: wetness, frost action.	Moderate: wetness, droughty.
MuD----- Munising	Severe: cutbanks cave, wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness, slope.	Moderate: wetness, slope, frost action.	Moderate: wetness, droughty, slope.
MuE----- Munising	Severe: cutbanks cave, slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
Nh----- Nahma	Severe: depth to rock, ponding.	Severe: ponding.	Severe: ponding, depth to rock.	Severe: ponding.	Severe: ponding, frost action.	Severe: ponding, excess humus.
NsA----- Nester	Moderate: too clayey, wetness.	Moderate: shrink-swell.	Moderate: wetness, shrink-swell.	Moderate: shrink-swell.	Severe: low strength.	Slight.
NsB----- Nester	Moderate: too clayey.	Moderate: shrink-swell.	Moderate: shrink-swell.	Moderate: shrink-swell, slope.	Severe: low strength.	Slight.

See footnote at end of table.

TABLE 9.--BUILDING SITE DEVELOPMENT--Continued

Soil name and map symbol	Shallow excavations	Dwellings without basements	Dwellings with basements	Small commercial buildings	Local roads and streets	Lawns and landscaping
OnA----- Onaway	Moderate: wetness, dense layer.	Slight-----	Moderate: wetness.	Slight-----	Moderate: frost action.	Moderate: large stones.
OnB----- Onaway	Slight-----	Slight-----	Slight-----	Moderate: slope.	Moderate: frost action.	Moderate: large stones.
OnC----- Onaway	Moderate: slope.	Moderate: slope.	Moderate: slope.	Severe: slope.	Moderate: slope, frost action.	Moderate: large stones, slope.
OnD----- Onaway	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
OoE*: Onota-----	Severe: depth to rock, cutbanks cave, slope.	Severe: slope.	Severe: depth to rock, slope.	Severe: slope.	Severe: slope.	Severe: slope.
Chippeny-----	Severe: depth to rock, cutbanks cave, ponding, ponding.	Severe: subsides, ponding, low strength.	Severe: subsides, ponding, depth to rock.	Severe: subsides, ponding, low strength.	Severe: subsides, ponding, frost action.	Severe: ponding, excess humus.
OrB*: Onota-----	Severe: depth to rock, cutbanks cave.	Moderate: depth to rock.	Severe: depth to rock.	Moderate: depth to rock.	Moderate: depth to rock, frost action.	Moderate: large stones.
Deerton-----	Severe: depth to rock, cutbanks cave.	Moderate: depth to rock.	Severe: depth to rock.	Moderate: depth to rock.	Moderate: depth to rock.	Moderate: droughty, depth to rock.
OrD*: Onota-----	Severe: depth to rock, cutbanks cave.	Moderate: slope, depth to rock.	Severe: depth to rock.	Severe: slope.	Moderate: depth to rock, slope, frost action.	Moderate: large stones, slope.
Deerton-----	Severe: depth to rock, cutbanks cave.	Moderate: slope, depth to rock.	Severe: depth to rock.	Severe: slope.	Moderate: depth to rock, slope.	Moderate: droughty, slope, depth to rock.
OtB----- Otisco	Severe: cutbanks cave, wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.
Pc----- Pickford	Severe: ponding.	Severe: ponding, shrink-swell.	Severe: ponding, shrink-swell.	Severe: ponding, shrink-swell.	Severe: shrink-swell, low strength, ponding.	Severe: ponding.
PfA----- Algonquin	Severe: wetness.	Severe: wetness, shrink-swell.	Severe: wetness, shrink-swell.	Severe: wetness, shrink-swell.	Severe: shrink-swell, low strength, wetness.	Severe: wetness.

See footnote at end of table.

TABLE 9.--BUILDING SITE DEVELOPMENT--Continued

Soil name and map symbol	Shallow excavations	Dwellings without basements	Dwellings with basements	Small commercial buildings	Local roads and streets	Lawns and landscaping
PkA*: Algonquin-----	Severe: wetness.	Severe: wetness, shrink-swell.	Severe: wetness, shrink-swell.	Severe: wetness, shrink-swell.	Severe: shrink-swell, low strength, wetness.	Severe: wetness.
Pickford-----	Severe: ponding.	Severe: ponding, shrink-swell.	Severe: ponding, shrink-swell.	Severe: ponding, shrink-swell.	Severe: shrink-swell, low strength, ponding.	Severe: ponding.
Rc----- Roscommon	Severe: cutbanks cave, ponding.	Severe: ponding.	Severe: ponding.	Severe: ponding.	Severe: ponding.	Severe: ponding.
RkB*: Roscommon-----	Severe: cutbanks cave, ponding.	Severe: ponding.	Severe: ponding.	Severe: ponding.	Severe: ponding.	Severe: ponding.
Kalkaska-----	Severe: cutbanks cave.	Slight-----	Slight-----	Slight-----	Slight-----	Moderate: droughty, too sandy.
RoB----- Rousseau	Severe: cutbanks cave.	Slight-----	Slight-----	Slight-----	Slight-----	Moderate: droughty.
RoD----- Rousseau	Severe: cutbanks cave.	Moderate: slope.	Moderate: slope.	Severe: slope.	Moderate: slope.	Moderate: droughty, slope.
RsD----- Rousseau	Severe: cutbanks cave, slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
RuB----- Rubicon	Severe: cutbanks cave.	Slight-----	Slight-----	Slight-----	Slight-----	Severe: droughty.
RuD----- Rubicon	Severe: cutbanks cave.	Moderate: slope.	Moderate: slope.	Severe: slope.	Moderate: slope.	Severe: droughty.
RuE----- Rubicon	Severe: cutbanks cave, slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: droughty, slope.
Rv----- Ruse	Severe: depth to rock, ponding.	Severe: depth to rock.	Severe: depth to rock.	Severe: depth to rock.	Severe: depth to rock, ponding, frost action.	Severe: ponding, depth to rock.
ScA----- Finch	Severe: cemented pan, cutbanks cave, wetness.	Severe: wetness.	Severe: wetness, cemented pan.	Severe: wetness.	Severe: wetness.	Severe: wetness, droughty, cemented pan.
ShB----- Sheldrake	Severe: cutbanks cave.	Slight-----	Slight-----	Moderate: slope.	Slight-----	Moderate: droughty, too sandy.

See footnote at end of table.

TABLE 9.--BUILDING SITE DEVELOPMENT--Continued

Soil name and map symbol	Shallow excavations	Dwellings without basements	Dwellings with basements	Small commercial buildings	Local roads and streets	Lawns and landscaping
SkB----- Skaneee	Severe: cutbanks cave, wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness, frost action.	Severe: wetness.
StB----- Steuben	Severe: cutbanks cave, wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Moderate: wetness, frost action.	Moderate: wetness, droughty.
StD----- Steuben	Severe: cutbanks cave, wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness, slope.	Moderate: wetness, slope, frost action.	Moderate: wetness, slope, droughty, slope.
SuA----- Summerville	Severe: depth to rock.	Severe: depth to rock.	Severe: depth to rock.	Severe: depth to rock.	Severe: depth to rock.	Severe: depth to rock.
SvA----- Sundell	Severe: depth to rock, wetness.	Severe: wetness.	Severe: wetness, depth to rock.	Severe: wetness.	Severe: wetness, frost action.	Severe: wetness.
SwA----- Sundell variant	Severe: depth to rock, cutbanks cave, wetness.	Severe: wetness.	Severe: wetness, depth to rock.	Severe: wetness.	Moderate: depth to rock, wetness, frost action.	Moderate: depth to rock, wetness, droughty, depth to rock.
Ta----- Tawas	Severe: cutbanks cave, excess humus, ponding, ponding.	Severe: subsides, excess humus, ponding, low strength.	Severe: subsides, ponding.	Severe: subsides, ponding, low strength.	Severe: subsides, ponding, frost action.	Severe: ponding, excess humus.
TrA----- Trenary	Severe: cutbanks cave.	Slight-----	Moderate: wetness.	Slight-----	Moderate: frost action.	Moderate: large stones.
TrB----- Trenary	Severe: cutbanks cave.	Slight-----	Slight-----	Moderate: slope.	Moderate: frost action.	Moderate: large stones.
TrC----- Trenary	Severe: cutbanks cave.	Moderate: slope.	Moderate: slope.	Severe: slope.	Moderate: slope, frost action.	Moderate: large stones, slope.
TrD----- Trenary	Severe: cutbanks cave, slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
WaA----- Wainola	Severe: cutbanks cave, wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.
WLB----- Wallace	Severe: cemented pan, cutbanks cave.	Moderate: cemented pan.	Severe: cemented pan.	Moderate: cemented pan.	Moderate: cemented pan.	Severe: droughty, cemented pan.
WLD----- Wallace	Severe: cemented pan, cutbanks cave.	Moderate: slope, cemented pan.	Severe: cemented pan.	Severe: slope.	Moderate: cemented pan, slope.	Severe: droughty, cemented pan.
Wm----- Wheatley	Severe: cutbanks cave, ponding.	Severe: ponding.	Severe: ponding.	Severe: ponding.	Severe: ponding.	Severe: ponding.

See footnote at end of table.

TABLE 9.--BUILDING SITE DEVELOPMENT--Continued

Soil name and map symbol	Shallow excavations	Dwellings without basements	Dwellings with basements	Small commercial buildings	Local roads and streets	Lawns and landscaping
YaB----- Yalmer	Severe: cutbanks wetness. wetness.	Moderate: cave, wetness.	Severe: wetness.	Moderate: wetness.	Moderate: wetness.	Severe: droughty.
YaD----- Yalmer	Severe: cutbanks wetness, wetness.	Moderate: slope.	Severe: wetness.	Severe: slope.	Moderate: wetness, slope.	Severe: droughty.

* See description of the map unit for composition and behavior characteristics of the map unit.

TABLE 10.--SANITARY FACILITIES

(Some terms that describe restrictive soil features are defined in the "Glossary." See text for definitions of "slight," "good," and other terms. Absence of an entry indicates that the soil was not rated. The information in this table indicates the dominant soil condition but does not eliminate the need for onsite investigation)

Soil name and map symbol	Septic tank absorption fields	Sewage lagoon areas	Trench sanitary landfill	Area sanitary landfill	Daily cover for landfill
Ad*----- Alluvial land	Severe: flooding, ponding.	Severe: flooding, ponding.	Severe: flooding, ponding.	Severe: flooding, ponding.	Poor: ponding.
AlC----- Alpena	Severe: poor filter.	Severe: seepage.	Severe: seepage, too sandy.	Severe: seepage.	Poor: seepage, too sandy, small stones.
AuB----- Au Gres	Severe: wetness, poor filter.	Severe: seepage, wetness.	Severe: seepage, wetness, too sandy.	Severe: seepage, wetness.	Poor: seepage, too sandy, wetness.
AvA----- Battlefield	Severe: wetness, poor filter.	Severe: seepage, wetness.	Severe: seepage, wetness, too sandy.	Severe: seepage, wetness.	Poor: seepage, too sandy, small stones.
B1B----- Blue Lake	Slight-----	Severe: seepage.	Severe: seepage, too sandy.	Severe: seepage.	Poor: seepage, too sandy.
B1D----- Blue Lake	Moderate: slope.	Severe: seepage, slope.	Severe: seepage, too sandy.	Severe: seepage.	Poor: seepage, too sandy.
B1E----- Blue Lake	Severe: slope.	Severe: seepage, slope.	Severe: seepage, slope, too sandy.	Severe: seepage, slope.	Poor: seepage, too sandy, slope.
BoB----- Bohemian	Severe: percs slowly.	Moderate: seepage, slope.	Severe: too clayey, too sandy.	Slight-----	Poor: too clayey.
BoD----- Bohemian	Severe: percs slowly.	Severe: slope.	Severe: too clayey, too sandy.	Moderate: slope.	Poor: too clayey.
Bp*. Borrow pits					
BrA----- Bowers	Severe: wetness, percs slowly.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Poor: wetness.
Bs----- Brevort	Severe: ponding, percs slowly, poor filter.	Severe: seepage, ponding.	Severe: ponding.	Severe: seepage, ponding.	Poor: ponding.
BtA----- Brimley	Severe: wetness, percs slowly.	Severe: wetness.	Severe: wetness, too sandy.	Severe: wetness.	Poor: wetness.

See footnote at end of table.

TABLE 10.--SANITARY FACILITIES--Continued

Soil name and map symbol	Septic tank absorption fields	Sewage lagoon areas	Trench sanitary landfill	Area sanitary landfill	Daily cover for landfill
Bu----- Bruce variant	Severe: ponding.	Severe: ponding.	Severe: ponding, too sandy.	Severe: ponding.	Poor: ponding.
BwC----- Burt	Severe: depth to rock, ponding.	Severe: seepage, depth to rock, ponding.	Severe: depth to rock, seepage, ponding.	Severe: depth to rock, ponding.	Poor: depth to rock, seepage, too sandy.
Cb*: Carbondale-----	Severe: subsides, ponding, percs slowly.	Severe: seepage, excess humus, ponding.	Severe: seepage, ponding, excess humus.	Severe: seepage, ponding.	Poor: ponding, excess humus.
Lupton-----	Severe: subsides, ponding, percs slowly.	Severe: seepage, excess humus, ponding.	Severe: seepage, ponding, excess humus.	Severe: seepage, ponding.	Poor: ponding, excess humus.
Rifle-----	Severe: ponding.	Severe: seepage, excess humus, ponding.	Severe: seepage, ponding, excess humus.	Severe: seepage, ponding.	Poor: ponding, excess humus.
Ch----- Cathro	Severe: ponding, percs slowly.	Severe: seepage, excess humus, ponding.	Severe: ponding.	Severe: seepage, ponding.	Poor: ponding.
Ck*: Cathro-----	Severe: ponding, percs slowly.	Severe: seepage, excess humus, ponding.	Severe: ponding.	Severe: seepage, ponding.	Poor: ponding.
Tacoosh-----	Severe: ponding, percs slowly.	Severe: seepage, excess humus, ponding.	Severe: ponding, excess humus.	Severe: seepage, ponding.	Poor: ponding, excess humus.
CLA----- Charlevoix	Severe: wetness.	Severe: seepage, wetness.	Severe: seepage, wetness.	Severe: seepage, wetness.	Poor: wetness.
CmA, CmB----- Chatham	Moderate: large stones.	Severe: seepage.	Severe: seepage, large stones.	Severe: seepage.	Poor: seepage, large stones.
CmD----- Chatham	Moderate: slope, large stones.	Severe: seepage, slope.	Severe: seepage, large stones.	Severe: seepage.	Poor: seepage, large stones.
Cn----- Chippeny	Severe: depth to rock, ponding, percs slowly.	Severe: depth to rock, excess humus, ponding.	Severe: depth to rock, ponding, excess humus.	Severe: depth to rock, ponding.	Poor: depth to rock, ponding, excess humus.

See footnote at end of table.

TABLE 10.--SANITARY FACILITIES--Continued

Soil name and map symbol	Septic tank absorption fields	Sewage lagoon areas	Trench sanitary landfill	Area sanitary landfill	Daily cover for landfill
CrA----- Croswell	Severe: wetness, poor filter.	Severe: seepage, wetness.	Severe: seepage, wetness, too sandy.	Severe: seepage, wetness.	Poor: seepage, too sandy.
Da----- Dawson	Severe: subsides, ponding, percs slowly.	Severe: seepage, excess humus, ponding.	Severe: seepage, ponding, excess humus.	Severe: seepage, ponding.	Poor: ponding, excess humus.
Dd*: Dawson-----	Severe: subsides, ponding, percs slowly.	Severe: seepage, excess humus, ponding.	Severe: seepage, ponding, excess humus.	Severe: seepage, ponding.	Poor: ponding, excess humus.
Greenwood-----	Severe: ponding.	Severe: seepage, excess humus, ponding.	Severe: seepage, ponding, excess humus.	Severe: seepage, ponding.	Poor: ponding, excess humus.
DeB----- Deerton	Severe: depth to rock.	Severe: seepage, depth to rock.	Severe: depth to rock, seepage.	Severe: depth to rock, seepage.	Poor: depth to rock, seepage, too sandy.
DeD----- Deerton	Severe: depth to rock.	Severe: seepage, depth to rock, slope.	Severe: depth to rock, seepage.	Severe: depth to rock, seepage.	Poor: depth to rock, seepage, too sandy.
DlB*: Deerton-----	Severe: depth to rock.	Severe: seepage, depth to rock.	Severe: depth to rock, seepage.	Severe: depth to rock, seepage.	Poor: depth to rock, seepage, too sandy.
Burt-----	Severe: depth to rock, ponding.	Severe: seepage, depth to rock, ponding.	Severe: depth to rock, seepage, ponding.	Severe: depth to rock, ponding.	Poor: depth to rock, seepage, too sandy.
Dm----- Deford	Severe: ponding, poor filter.	Severe: seepage, ponding.	Severe: seepage, ponding, too sandy.	Severe: seepage, ponding.	Poor: seepage, too sandy, ponding.
DuB----- Duel	Severe: depth to rock, poor filter.	Severe: seepage, depth to rock.	Severe: depth to rock, seepage, too sandy.	Severe: depth to rock, seepage.	Poor: depth to rock, seepage, too sandy.
EaB----- Springlake	Severe: poor filter.	Severe: seepage.	Severe: seepage, too sandy.	Severe: seepage.	Poor: seepage, too sandy.
EcB----- Adams	Severe: poor filter.	Severe: seepage.	Severe: seepage, too sandy.	Severe: seepage.	Poor: seepage, too sandy.

See footnote at end of table.

TABLE 10.--SANITARY FACILITIES--Continued

Soil name and map symbol	Septic tank absorption fields	Sewage lagoon areas	Trench sanitary landfill	Area sanitary landfill	Daily cover for landfill
EcD----- Adams	Severe: poor filter.	Severe: seepage, slope.	Severe: seepage, too sandy.	Severe: seepage.	Poor: seepage, too sandy.
EdB----- Eastport	Severe: poor filter.	Severe: seepage.	Severe: seepage, too sandy.	Severe: seepage.	Poor: seepage, too sandy.
EeB*: Eastport-----	Severe: poor filter.	Severe: seepage.	Severe: seepage, too sandy.	Severe: seepage.	Poor: seepage, too sandy.
Roscommon-----	Severe: ponding, poor filter.	Severe: seepage, ponding.	Severe: seepage, ponding, too sandy.	Severe: seepage, ponding.	Poor: seepage, too sandy, ponding.
EmA, EmB----- Emmet	Moderate: percs slowly.	Severe: seepage.	Severe: seepage.	Severe: seepage.	Fair: small stones.
EmC----- Emmet	Moderate: percs slowly, slope.	Severe: seepage, slope.	Severe: seepage.	Severe: seepage.	Fair: small stones, slope.
EnA----- Ensign	Severe: depth to rock, wetness.	Severe: depth to rock, wetness.	Severe: depth to rock, wetness.	Severe: depth to rock, wetness.	Poor: depth to rock, wetness.
Es*: Ensley-----	Severe: ponding.	Severe: seepage, ponding.	Severe: seepage, ponding.	Severe: seepage, ponding.	Poor: ponding.
Angelica-----	Severe: ponding, percs slowly.	Severe: ponding.	Severe: ponding.	Severe: ponding.	Poor: small stones, ponding.
FaA, FaB----- Fairport	Severe: depth to rock, percs slowly.	Severe: depth to rock.	Severe: depth to rock.	Severe: depth to rock.	Poor: depth to rock.
GcB----- Gilchrist	Severe: wetness.	Severe: seepage, wetness.	Severe: wetness.	Severe: seepage, wetness.	Fair: large stones, wetness.
GrB----- Grayling	Severe: poor filter.	Severe: seepage.	Severe: seepage, too sandy.	Severe: seepage.	Poor: seepage, too sandy.
GrD----- Grayling	Severe: poor filter.	Severe: seepage, slope.	Severe: seepage, too sandy.	Severe: seepage.	Poor: seepage, too sandy.
Gw----- Greenwood	Severe: ponding.	Severe: seepage, excess humus, ponding.	Severe: seepage, ponding, excess humus.	Severe: seepage, ponding.	Poor: ponding, excess humus.

See footnote at end of table.

TABLE 10.--SANITARY FACILITIES--Continued

Soil name and map symbol	Septic tank absorption fields	Sewage lagoon areas	Trench sanitary landfill	Area sanitary landfill	Daily cover for landfill
IoB----- Iosco	Severe: wetness, percs slowly, poor filter.	Severe: seepage, wetness.	Severe: wetness, too sandy.	Severe: seepage, wetness.	Poor: seepage, too sandy, wetness.
KaB----- Kalkaska	Severe: poor filter.	Severe: seepage.	Severe: seepage, too sandy.	Severe: seepage.	Poor: seepage, too sandy.
KaD----- Kalkaska	Severe: poor filter.	Severe: seepage, slope.	Severe: seepage, too sandy.	Severe: seepage.	Poor: seepage, too sandy.
KaE----- Kalkaska	Severe: poor filter, slope.	Severe: seepage, slope.	Severe: seepage, slope, too sandy.	Severe: seepage, slope.	Poor: seepage, too sandy, slope.
KdB----- Karlin	Severe: poor filter.	Severe: seepage.	Severe: seepage, too sandy.	Severe: seepage.	Poor: seepage, too sandy.
KdD----- Karlin	Severe: poor filter.	Severe: seepage, slope.	Severe: seepage, too sandy.	Severe: seepage.	Poor: seepage, too sandy.
KgC----- Kawbawgam	Severe: depth to rock, wetness.	Severe: seepage, depth to rock.	Severe: depth to rock, seepage, wetness.	Severe: depth to rock, seepage, wetness.	Poor: depth to rock, wetness.
KlA----- Kawkawlin	Severe: wetness, percs slowly.	Slight-----	Severe: wetness.	Severe: wetness.	Poor: wetness.
KnB----- Keweenaw	Moderate: percs slowly.	Severe: seepage.	Severe: seepage.	Severe: seepage.	Poor: seepage, small stones.
KnD----- Keweenaw	Moderate: percs slowly, slope.	Severe: seepage, slope.	Severe: seepage.	Severe: seepage.	Poor: seepage, small stones.
Kr----- Kinross	Severe: ponding, poor filter.	Severe: seepage, ponding.	Severe: seepage, ponding, too sandy.	Severe: seepage, ponding.	Poor: seepage, too sandy, ponding.
KsB----- Kiva	Severe: poor filter.	Severe: seepage.	Severe: seepage, too sandy.	Severe: seepage.	Poor: seepage, too sandy, small stones.
KsD----- Kiva	Severe: poor filter.	Severe: seepage, slope.	Severe: seepage, too sandy.	Severe: seepage.	Poor: seepage, too sandy, small stones.
Lb*. Lake beaches					

See footnote at end of table.

TABLE 10.--SANITARY FACILITIES--Continued

Soil name and map symbol	Septic tank absorption fields	Sewage lagoon areas	Trench sanitary landfill	Area sanitary landfill	Daily cover for landfill
Lm*. Limestone rock land					
LoA, LoB----- Longrie	Severe: depth to rock.	Severe: depth to rock.	Severe: depth to rock.	Severe: depth to rock.	Poor: depth to rock.
LsD*: Longrie-----	Severe: depth to rock.	Severe: depth to rock, slope.	Severe: depth to rock.	Severe: depth to rock.	Poor: depth to rock.
Summerville-----	Severe: depth to rock.	Severe: depth to rock, slope.	Severe: depth to rock.	Severe: depth to rock.	Poor: depth to rock.
Ma*. Made land					
McB----- Mancelona	Severe: poor filter.	Severe: seepage.	Severe: seepage, too sandy.	Severe: seepage.	Poor: seepage, too sandy, small stones.
McD----- Mancelona	Severe: poor filter.	Severe: seepage, slope.	Severe: seepage, too sandy.	Severe: seepage.	Poor: seepage, too sandy, small stones.
Mh*. Marsh					
MLB----- Melita	Severe: percs slowly, poor filter.	Severe: seepage.	Severe: too sandy.	Severe: seepage.	Poor: seepage, too sandy.
MnB----- Menominee	Severe: percs slowly, poor filter.	Severe: seepage.	Severe: too sandy.	Severe: seepage.	Poor: seepage, too sandy.
MnD----- Menominee	Severe: percs slowly, poor filter.	Severe: seepage, slope.	Severe: too sandy.	Severe: seepage.	Poor: seepage, too sandy.
MuB----- Munising	Severe: wetness, percs slowly.	Moderate: seepage, slope.	Severe: wetness.	Severe: wetness.	Poor: seepage, wetness.
MuD----- Munising	Severe: wetness, percs slowly.	Severe: slope.	Severe: wetness.	Severe: wetness.	Poor: seepage, wetness.
MuE----- Munising	Severe: percs slowly, slope.	Severe: slope.	Severe: slope.	Severe: slope.	Poor: seepage, slope.
Nh----- Nahma	Severe: depth to rock, ponding.	Severe: depth to rock, excess humus, ponding.	Severe: depth to rock, ponding.	Severe: depth to rock, ponding.	Poor: depth to rock, ponding.

See footnote at end of table.

TABLE 10.--SANITARY FACILITIES--Continued

Soil name and map symbol	Septic tank absorption fields	Sewage lagoon areas	Trench sanitary landfill	Area sanitary landfill	Daily cover for landfill
NsA----- Nester	Severe: wetness, percs slowly.	Slight-----	Moderate: wetness, too clayey.	Moderate: wetness.	Fair: too clayey, small stones.
NaB----- Nester	Severe: percs slowly.	Moderate: seepage, slope.	Moderate: too clayey.	Slight-----	Fair: too clayey, small stones.
OnA----- Onaway	Severe: wetness, percs slowly.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Poor: small stones.
OnB----- Onaway	Severe: percs slowly.	Moderate: slope.	Slight-----	Slight-----	Poor: small stones.
OnC----- Onaway	Severe: percs slowly.	Severe: slope.	Moderate: slope.	Moderate: slope.	Poor: small stones.
OnD----- Onaway	Severe: percs slowly, slope.	Severe: slope.	Severe: slope.	Severe: slope.	Poor: small stones, slope.
OoE*: Onota-----	Severe: depth to rock, slope.	Severe: seepage, depth to rock, slope.	Severe: depth to rock, seepage, slope.	Severe: depth to rock, seepage, slope.	Poor: depth to rock, slope.
Chippeny-----	Severe: depth to rock, ponding, percs slowly.	Severe: depth to rock, excess humus, ponding.	Severe: depth to rock, ponding, excess humus.	Severe: depth to rock, ponding.	Poor: depth to rock, ponding, excess humus.
OrB*: Onota-----	Severe: depth to rock.	Severe: seepage, depth to rock.	Severe: depth to rock, seepage.	Severe: depth to rock, seepage.	Poor: depth to rock.
Deeroton-----	Severe: depth to rock.	Severe: seepage, depth to rock.	Severe: depth to rock, seepage.	Severe: depth to rock, seepage.	Poor: depth to rock, seepage, too sandy.
OrD*: Onota-----	Severe: depth to rock.	Severe: seepage, depth to rock, slope.	Severe: depth to rock, seepage.	Severe: depth to rock, seepage.	Poor: depth to rock.
Deeroton-----	Severe: depth to rock.	Severe: seepage, depth to rock, slope.	Severe: depth to rock, seepage.	Severe: depth to rock, seepage.	Poor: depth to rock, seepage, too sandy.
OtB----- Otisco	Severe: wetness.	Severe: seepage, wetness.	Severe: seepage, wetness, too sandy.	Severe: seepage, wetness.	Poor: seepage, too sandy, wetness.

See footnote at end of table.

TABLE 10.--SANITARY FACILITIES--Continued

Soil name and map symbol	Septic tank absorption fields	Sewage lagoon areas	Trench sanitary landfill	Area sanitary landfill	Daily cover for landfill
Pc----- Pickford	Severe: ponding, percs slowly.	Severe: ponding.	Severe: ponding, too clayey.	Severe: ponding.	Poor: too clayey, hard to pack, ponding.
PfA----- Algonquin	Severe: wetness, percs slowly.	Slight-----	Severe: wetness, too clayey.	Severe: wetness.	Poor: too clayey, hard to pack, wetness.
PkA*: Algonquin-----	Severe: wetness, percs slowly.	Moderate: slope.	Severe: wetness, too clayey.	Severe: wetness.	Poor: too clayey, hard to pack, wetness.
Pickford-----	Severe: ponding, percs slowly.	Severe: ponding.	Severe: ponding, too clayey.	Severe: ponding.	Poor: too clayey, hard to pack, ponding.
Rc----- Roscommon	Severe: ponding, poor filter.	Severe: seepage, ponding.	Severe: seepage, ponding, too sandy.	Severe: seepage, ponding.	Poor: seepage, too sandy, ponding.
RkB*: Roscommon-----	Severe: ponding, poor filter.	Severe: seepage, ponding.	Severe: seepage, ponding, too sandy.	Severe: seepage, ponding.	Poor: seepage, too sandy, ponding.
Kalkaska-----	Severe: poor filter.	Severe: seepage.	Severe: seepage, too sandy.	Severe: seepage.	Poor: seepage, too sandy.
RoB----- Rousseau	Severe: poor filter.	Severe: seepage.	Severe: seepage, too sandy.	Severe: seepage.	Poor: seepage, too sandy.
RoD----- Rousseau	Severe: poor filter.	Severe: seepage, slope.	Severe: seepage, too sandy.	Severe: seepage.	Poor: seepage, too sandy.
RsD----- Rousseau	Severe: poor filter, slope.	Severe: seepage, slope.	Severe: seepage, slope, too sandy.	Severe: seepage, slope.	Poor: seepage, too sandy, slope.
RuB----- Rubicon	Severe: poor filter.	Severe: seepage.	Severe: seepage, too sandy.	Severe: seepage.	Poor: seepage, too sandy.
RuD----- Rubicon	Severe: poor filter.	Severe: seepage, slope.	Severe: seepage, too sandy.	Severe: seepage.	Poor: seepage, too sandy.
RuE----- Rubicon	Severe: poor filter, slope.	Severe: seepage, slope.	Severe: seepage, slope, too sandy.	Severe: seepage, slope.	Poor: seepage, too sandy, slope.

See footnote at end of table.

TABLE 10.--SANITARY FACILITIES--Continued

Soil name and map symbol	Septic tank absorption fields	Sewage lagoon areas	Trench sanitary landfill	Area sanitary landfill	Daily cover for landfill
Rv----- Ruse	Severe: depth to rock, ponding.	Severe: seepage, depth to rock, ponding.	Severe: depth to rock, seepage, ponding.	Severe: depth to rock, ponding.	Poor: depth to rock, large stones, ponding.
ScA----- Finch	Severe: cemented pan, wetness, poor filter.	Severe: seepage, cemented pan, wetness.	Severe: seepage, wetness, too sandy.	Severe: cemented pan, seepage, wetness.	Poor: cemented pan, seepage, too sandy.
ShB----- Shelldrake	Severe: poor filter.	Severe: seepage.	Severe: seepage, too sandy.	Severe: seepage.	Poor: seepage, too sandy.
SkB----- Skaneee	Severe: wetness, percs slowly.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Poor: wetness.
StB----- Steuben	Severe: wetness, percs slowly, poor filter.	Severe: seepage, wetness.	Severe: seepage, wetness.	Severe: seepage, wetness.	Poor: seepage, too sandy.
StD----- Steuben	Severe: wetness, percs slowly, poor filter.	Severe: seepage, slope, wetness.	Severe: seepage, wetness.	Severe: seepage, wetness.	Poor: seepage, too sandy.
SuA----- Summerville	Severe: depth to rock.	Severe: depth to rock.	Severe: depth to rock.	Severe: depth to rock.	Poor: depth to rock.
SvA----- Sundell	Severe: depth to rock, wetness, poor filter.	Severe: depth to rock, seepage, wetness.	Severe: depth to rock, seepage, wetness.	Severe: depth to rock, seepage, wetness.	Poor: depth to rock, wetness.
SwA----- Sundell variant	Severe: depth to rock, wetness, poor filter.	Severe: seepage, depth to rock, wetness.	Severe: depth to rock, seepage, wetness.	Severe: depth to rock, seepage, wetness.	Poor: depth to rock, wetness.
Ta----- Tawas	Severe: subsides, ponding, percs slowly.	Severe: seepage, excess humus, ponding.	Severe: seepage, ponding, too sandy.	Severe: seepage, ponding.	Poor: seepage, too sandy, ponding.
TrA----- Trenary	Severe: wetness.	Severe: seepage, wetness.	Severe: wetness.	Severe: wetness.	Fair: wetness.
TrB----- Trenary	Moderate: percs slowly.	Severe: seepage.	Slight-----	Slight-----	Good.
TrC----- Trenary	Moderate: percs slowly, slope.	Severe: seepage, slope.	Moderate: slope.	Moderate: slope.	Fair: slope.
TrD----- Trenary	Severe: slope.	Severe: seepage, slope.	Severe: slope.	Severe: slope.	Poor: slope.

See footnote at end of table.

TABLE 10.--SANITARY FACILITIES--Continued

Soil name and map symbol	Septic tank absorption fields	Sewage lagoon areas	Trench sanitary landfill	Area sanitary landfill	Daily cover for landfill
WaA----- Wainola	Severe: wetness, poor filter.	Severe: seepage, wetness.	Severe: seepage, wetness, too sandy.	Severe: seepage, wetness.	Poor: too sandy, wetness.
WlB----- Wallace	Severe: cemented pan, poor filter.	Severe: seepage, cemented pan.	Severe: seepage, too sandy.	Severe: cemented pan, seepage.	Poor: cemented pan, seepage, too sandy.
WlD----- Wallace	Severe: cemented pan, poor filter.	Severe: seepage, cemented pan, slope.	Severe: seepage, too sandy.	Severe: cemented pan, seepage.	Poor: cemented pan, seepage, too sandy.
Wm----- Wheatley	Severe: ponding, poor filter.	Severe: seepage, ponding.	Severe: seepage, too sandy.	Severe: seepage, ponding.	Poor: seepage, too sandy, small stones.
YaB----- Yalmer	Severe: wetness, percs slowly.	Severe: seepage, wetness.	Severe: wetness.	Severe: seepage.	Fair: small stones, wetness.
YaD----- Yalmer	Severe: wetness, percs slowly.	Severe: seepage, slope, wetness.	Severe: wetness.	Severe: seepage.	Fair: small stones, slope, wetness.

* See description of the map unit for composition and behavior characteristics of the map unit.

TABLE 11.--CONSTRUCTION MATERIALS

(Some terms that describe restrictive soil features are defined in the "Glossary." See text for definitions of "good," "fair," and other terms. Absence of an entry indicates that the soil was not rated. The information in this table indicates the dominant soil condition but does not eliminate the need for onsite investigation)

Soil name and map symbol	Roadfill	Sand	Gravel	Topsoil
Ad*----- Alluvial land	Poor: wetness.	Improbable: excess fines.	Improbable: excess fines.	Poor: wetness.
AlC----- Alpena	Good-----	Probable-----	Probable-----	Poor: too sandy, small stones, area reclaim.
AuB----- Au Gres	Poor: wetness.	Probable-----	Improbable: too sandy.	Poor: too sandy, wetness.
AvA----- Battlefield	Poor: wetness.	Probable-----	Probable-----	Poor: too sandy, small stones, area reclaim.
BlB, BlD----- Blue Lake	Good-----	Probable-----	Improbable: too sandy.	Poor: too sandy.
BLE----- Blue Lake	Poor: slope.	Probable-----	Improbable: too sandy.	Poor: too sandy, slope.
BoB----- Bohemian	Fair: low strength.	Improbable: excess fines.	Improbable: excess fines.	Fair: thin layer.
BoD----- Bohemian	Fair: low strength.	Improbable: excess fines.	Improbable: excess fines.	Fair: thin layer, slope.
Bp*. Borrow pits				
BrA----- Bowers	Poor: low strength.	Improbable: excess fines.	Improbable: excess fines.	Fair: too clayey.
Bs----- Brevort	Poor: wetness.	Improbable: excess fines.	Improbable: excess fines.	Poor: too sandy, small stones, wetness.
BtA----- Brimley	Fair: wetness.	Improbable: excess fines.	Improbable: excess fines.	Poor: too sandy.
Bu----- Bruce variant	Poor: wetness.	Improbable: excess fines.	Improbable: excess fines.	Poor: too sandy, wetness.
BwC----- Burt	Poor: depth to rock, wetness.	Improbable: thin layer.	Improbable: too sandy.	Poor: depth to rock, too sandy, wetness.

See footnote at end of table.

TABLE 11.--CONSTRUCTION MATERIALS--Continued

Soil name and map symbol	Roadfill	Sand	Gravel	Topsoil
Ch*: Carbondale-----	Poor: wetness.	Improbable: excess humus.	Improbable: excess humus.	Poor: excess humus, wetness.
Lupton-----	Poor: wetness.	Improbable: excess humus.	Improbable: excess humus.	Poor: excess humus, wetness.
Rifle-----	Poor: wetness, low strength.	Improbable: excess humus.	Improbable: excess humus.	Poor: excess humus, wetness.
Ch----- Cathro	Poor: wetness.	Improbable: excess fines.	Improbable: excess fines.	Poor: thin layer, wetness.
Ck*: Cathro-----	Poor: wetness.	Improbable: excess fines.	Improbable: excess fines.	Poor: thin layer, wetness.
Tacoosh-----	Poor: wetness.	Improbable: excess humus.	Improbable: excess humus.	Poor: excess humus, wetness.
CLA----- Charlevoix	Fair: wetness.	Improbable: excess fines.	Improbable: excess fines.	Poor: small stones.
CmA, CmB, CmD----- Chatham	Fair: large stones.	Improbable: large stones.	Improbable: too sandy, large stones.	Poor: large stones, area reclaim.
Cn----- Chippeny	Poor: depth to rock, wetness.	Improbable: excess humus.	Improbable: excess humus.	Poor: excess humus, small stones, wetness.
CrA----- Croswell	Fair: wetness.	Probable-----	Improbable: too sandy.	Poor: too sandy.
Da----- Dawson	Poor: wetness.	Probable-----	Improbable: too sandy.	Poor: excess humus, wetness.
Dd*: Dawson-----	Poor: wetness.	Probable-----	Improbable: too sandy.	Poor: excess humus, wetness.
Greenwood-----	Poor: wetness, low strength.	Improbable: excess humus.	Improbable: excess humus.	Poor: excess humus, wetness.
DeB, DeD----- Deerton	Poor: depth to rock.	Improbable: thin layer.	Improbable: too sandy.	Poor: too sandy.
DLB*: Deerton-----	Poor: depth to rock.	Improbable: thin layer.	Improbable: too sandy.	Poor: too sandy.

See footnote at end of table.

TABLE 11.--CONSTRUCTION MATERIALS--Continued

Soil name and map symbol	Roadfill	Sand	Gravel	Topsoil
D1B*: Burt-----	Poor: depth to rock, wetness.	Improbable: thin layer.	Improbable: too sandy.	Poor: depth to rock, too sandy, wetness.
Dm----- Deford	Poor: wetness.	Probable-----	Improbable: too sandy.	Poor: too sandy, wetness.
DuB----- Duel	Poor: depth to rock.	Improbable: thin layer.	Improbable: too sandy.	Poor: too sandy.
EaB----- Springlake	Good-----	Probable-----	Improbable-----	Poor: too sandy, small stones.
EcB, EcD----- Adams	Good-----	Probable-----	Improbable: too sandy.	Poor: too sandy.
EdB----- Eastport	Good-----	Probable-----	Improbable: too sandy.	Poor: too sandy.
EeB*: Eastport-----	Good-----	Probable-----	Improbable: too sandy.	Poor: too sandy.
Roscommon-----	Poor: wetness.	Probable-----	Improbable: too sandy.	Poor: too sandy, wetness.
EmA, EmB, EmC----- Emmet	Good-----	Improbable: excess fines.	Improbable: excess fines.	Poor: small stones.
EnA----- Ensign	Poor: depth to rock, wetness.	Improbable: excess fines.	Improbable: excess fines.	Poor: depth to rock, small stones, wetness.
Es*: Ensley-----	Poor: wetness.	Improbable: excess fines.	Improbable: excess fines.	Poor: small stones, wetness.
Angelica-----	Poor: wetness.	Improbable: excess fines.	Improbable: excess fines.	Poor: area reclaim, small stones, wetness.
FaA, FaB----- Fairport	Poor: depth to rock, low strength.	Improbable: excess fines.	Improbable: excess fines.	Poor: small stones.
GcB----- Gilchrist	Fair: wetness.	Improbable: excess fines.	Improbable: excess fines.	Poor: too sandy, area reclaim.
GrB, GrD----- Grayling	Good-----	Probable-----	Improbable: too sandy.	Poor: too sandy.

See footnote at end of table.

TABLE 11.--CONSTRUCTION MATERIALS--Continued

Soil name and map symbol	Roadfill	Sand	Gravel	Topsoil
Gw-----	Poor: Greenwood wetness, low strength.	Improbable: excess humus.	Improbable: excess humus.	Poor: excess humus, wetness.
IoB-----	Poor: Iosco wetness.	Improbable: thin layer.	Improbable: too sandy.	Poor: too sandy, wetness.
KaB, KaD-----	Good-----	Probable-----	Improbable: too sandy.	Poor: too sandy.
KaE-----	Poor: Kalkaska slope.	Probable-----	Improbable: too sandy.	Poor: too sandy, slope.
KdB-----	Good-----	Probable-----	Improbable: too sandy.	Fair: too sandy, small stones.
KdD-----	Good-----	Probable-----	Improbable: too sandy.	Fair: too sandy, small stones, slope.
KgC-----	Poor: Kawbawgam depth to rock, wetness.	Improbable: excess fines.	Improbable: excess fines.	Poor: large stones, wetness.
KlA-----	Poor: Kawkawlin low strength.	Improbable: excess fines.	Improbable: excess fines.	Poor: too clayey.
KnB, KnD-----	Good-----	Probable-----	Improbable: too sandy.	Poor: too sandy, small stones, area reclaim.
Kr-----	Poor: Kinross wetness.	Probable-----	Improbable: too sandy.	Poor: too sandy, wetness.
KsB, KsD-----	Good-----	Probable-----	Probable-----	Poor: too sandy, small stones, area reclaim.
Lb*. Lake beaches				
Lm*. Limestone rock land				
LoA, LoB-----	Poor: Longrie depth to rock.	Improbable: excess fines.	Improbable: excess fines.	Poor: large stones.
LsD*: Longrie-----	Poor: depth to rock.	Improbable: excess fines.	Improbable: excess fines.	Poor: large stones.
Summerville-----	Poor: depth to rock.	Improbable: excess fines.	Improbable: excess fines.	Poor: depth to rock.

See footnote at end of table.

TABLE 11.--CONSTRUCTION MATERIALS--Continued

Soil name and map symbol	Roadfill	Sand	Gravel	Topsoil
Ma*. Made land				
McB, McD----- Mancelona	Good-----	Probable-----	Probable-----	Poor: too sandy, small stones, area reclaim.
Mh* Marsh				
MLB----- Melita	Good-----	Improbable: thin layer.	Improbable: too sandy.	Poor: too sandy.
MnB, MnD----- Menominee	Good-----	Improbable: thin layer.	Improbable: too sandy.	Poor: too sandy, small stones.
MuB----- Munising	Fair: wetness.	Improbable: thin layer.	Improbable: too sandy.	Fair: area reclaim, too sandy.
MuD----- Munising	Fair: wetness.	Improbable: thin layer.	Improbable: too sandy.	Fair: area reclaim, too sandy, slope.
MuE----- Munising	Poor: slope.	Improbable: thin layer.	Improbable: too sandy.	Poor: slope.
Nh----- Nahma	Poor: depth to rock, wetness.	Improbable: excess fines.	Improbable: excess fines.	Poor: small stones, wetness.
NsA, NsB----- Nester	Poor: low strength.	Improbable: excess fines.	Improbable: excess fines.	Poor: too clayey, small stones.
OnA----- Onaway	Fair: wetness.	Improbable: excess fines.	Improbable: excess fines.	Poor: small stones, area reclaim.
OnB, OnC----- Onaway	Good-----	Improbable: excess fines.	Improbable: excess fines.	Poor: small stones, area reclaim.
OnD----- Onaway	Fair: slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: small stones, area reclaim, slope.
OoE*: Onota-----	Poor: depth to rock, slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: slope.
Chippeny-----	Poor: depth to rock, wetness.	Improbable: excess humus.	Improbable: excess humus.	Poor: excess humus, small stones, wetness.

See footnote at end of table.

TABLE 11.--CONSTRUCTION MATERIALS--Continued

Soil name and map symbol	Roadfill	Sand	Gravel	Topsoil
OrB*: Onota-----	Poor: depth to rock.	Improbable: excess fines.	Improbable: excess fines.	Fair: depth to rock, large stones.
Deerton-----	Poor: depth to rock.	Improbable: thin layer.	Improbable: too sandy.	Poor: too sandy.
OrD*: Onota-----	Poor: depth to rock.	Improbable: excess fines.	Improbable: excess fines.	Fair: depth to rock, large stones, slope.
Deerton-----	Poor: depth to rock.	Improbable: thin layer.	Improbable: too sandy.	Poor: too sandy.
OtB----- Otisco	Poor: wetness.	Probable-----	Improbable: too sandy.	Poor: too sandy, wetness.
Pc----- Pickford	Poor: shrink-swell, low strength, wetness.	Improbable: excess fines.	Improbable: excess fines.	Poor: too clayey, wetness.
PfA----- Algonquin	Poor: shrink-swell, low strength, wetness.	Improbable: excess fines.	Improbable: excess fines.	Poor: too clayey, wetness.
PkA*: Algonquin-----	Poor: shrink-swell, low strength, wetness.	Improbable: excess fines.	Improbable: excess fines.	Poor: too clayey, wetness.
Pickford-----	Poor: shrink-swell, low strength, wetness.	Improbable: excess fines.	Improbable: excess fines.	Poor: too clayey, wetness.
Rc----- Roscommon	Poor: wetness.	Probable-----	Improbable: too sandy.	Poor: too sandy, wetness.
RkB*: Roscommon-----	Poor: wetness.	Probable-----	Improbable: too sandy.	Poor: too sandy, wetness.
Kalkaska-----	Good-----	Probable-----	Improbable: too sandy.	Poor: too sandy.
RoB, RoD----- Rousseau	Good-----	Probable-----	Improbable: too sandy.	Poor: too sandy.
RsD----- Rousseau	Fair: slope.	Probable-----	Improbable: too sandy.	Poor: too sandy, slope.

See footnote at end of table.

TABLE 11.--CONSTRUCTION MATERIALS--Continued

Soil name and map symbol	Roadfill	Sand	Gravel	Topsoil
RuB, RuD Rubicon	Good-----	Probable-----	Improbable: too sandy.	Poor: too sandy.
RuE Rubicon	Poor: slope.	Probable-----	Improbable: too sandy.	Poor: too sandy, slope.
Rv Ruse	Poor: depth to rock, wetness.	Improbable: excess fines.	Improbable: excess fines.	Poor: depth to rock, small stones, wetness.
ScA Finch	Poor: wetness.	Probable-----	Improbable: too sandy.	Poor: cemented pan, area reclaim, too sandy.
ShB Shelldrake	Good-----	Probable-----	Improbable: too sandy.	Poor: too sandy.
SkB Skanee	Poor: wetness.	Improbable: excess fines.	Improbable: excess fines.	Poor: area reclaim, wetness.
StB, StD Steuben	Fair: wetness.	Probable-----	Improbable: too sandy.	Poor: area reclaim.
SuA Summerville	Poor: depth to rock.	Improbable: excess fines.	Improbable: excess fines.	Poor: depth to rock.
SvA Sundell	Poor: depth to rock, wetness.	Improbable: excess fines.	Improbable: excess fines.	Poor: wetness.
SwA Sundell variant	Poor: depth to rock.	Improbable: excess fines.	Improbable: excess fines.	Fair: depth to rock, too sandy, thin layer.
Ta Tawas	Poor: wetness.	Probable-----	Improbable: too sandy.	Poor: excess humus, wetness.
TrA Trenary	Fair: wetness.	Improbable: excess fines.	Improbable: excess fines.	Fair: small stones.
TrB Trenary	Good-----	Improbable: excess fines.	Improbable: excess fines.	Fair: small stones.
TrC Trenary	Good-----	Improbable: excess fines.	Improbable: excess fines.	Fair: small stones, slope.
TrD Trenary	Fair: slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: slope.
WaA Wainola	Poor: wetness.	Improbable: excess fines.	Improbable: excess fines.	Poor: too sandy, wetness.

See footnote at end of table.

TABLE 11.--CONSTRUCTION MATERIALS--Continued

Soil name and map symbol	Roadfill	Sand	Gravel	Topsoil
WlB, WlD----- Wallace	Good-----	Probable-----	Improbable: too sandy.	Poor: cemented pan, area reclaim, too sandy.
Wm----- Wheatley	Poor: wetness.	Probable-----	Probable-----	Poor: too sandy, small stones, area reclaim.
YaB, YaD----- Yalmer	Fair: wetness.	Improbable: excess fines.	Improbable: excess fines.	Poor: too sandy, small stones.

* See description of the map unit for composition and behavior characteristics of the map unit.

TABLE 12.--WATER MANAGEMENT

(Some terms that describe restrictive soil features are defined in the "Glossary." See text for definitions of "slight," "moderate," and "severe." Absence of an entry indicates that the soil was not evaluated. The information in this table indicates the dominant soil condition but does not eliminate the need for onsite investigation)

Soil name and map symbol	Limitations for--			Features affecting--		
	Pond reservoir areas	Embankments, dikes, and levees	Aquifer-fed excavated ponds	Drainage	Irrigation	Grassed waterways
Ad*----- Alluvial land	Slight-----	Severe: ponding.	Slight-----	Ponding, flooding.	Ponding, flooding.	Wetness.
AlC----- Alpena	Severe: seepage.	Severe: seepage.	Severe: no water.	Deep to water	Slope, droughty.	Droughty.
AuB----- Au Gres	Severe: seepage.	Severe: seepage, piping, wetness.	Severe: cutbanks cave.	Slope, cutbanks cave.	Slope, wetness, droughty.	(Wetness, droughty.
AvA----- Battlefield	Severe: seepage.	Severe: seepage, wetness.	Severe: cutbanks cave.	Cutbanks cave	Wetness, droughty, fast intake.	Wetness, droughty.
BlB----- Blue Lake	Severe: seepage.	Severe: seepage, piping.	Severe: no water.	Deep to water	Slope, droughty, fast intake.	Droughty.
BlD, BlE----- Blue Lake	Severe: seepage, slope.	Severe: seepage, piping.	Severe: no water.	Deep to water	Slope, droughty, fast intake.	Slope, droughty.
BoB----- Bohemian	Moderate: seepage, slope.	Severe: piping.	Severe: no water.	Deep to water	Slope-----	Erodes easily.
BoD----- Bohemian	Severe: slope.	Severe: piping.	Severe: no water.	Deep to water	Slope-----	Slope, erodes easily.
Bp*. Borrow pits						
BrA----- Bowers	Slight-----	Severe: wetness.	Severe: slow refill.	Percs slowly, frost action.	Wetness-----	Wetness, erodes easily, percs slowly.
Bs----- Brevort	Severe: seepage.	Severe: piping, ponding.	Severe: slow refill, cutbanks cave.	Ponding-----	Ponding, droughty, fast intake.	Wetness, erodes easily, droughty.
BtA----- Brimley	Slight-----	Severe: piping, wetness.	Severe: slow refill, cutbanks cave.	Frost action, cutbanks cave.	Wetness, soil blowing.	Wetness, erodes easily.
Bu----- Bruce variant	Moderate: seepage.	Severe: piping, ponding.	Severe: cutbanks cave.	Ponding, frost action, cutbanks cave.	Ponding, droughty, soil blowing.	Wetness, erodes easily, droughty.
BwC----- Burt	Severe: depth to rock.	Severe: thin layer, seepage, piping.	Severe: depth to rock, cutbanks cave.	Ponding, depth to rock, cutbanks cave.	Ponding, droughty.	Wetness, droughty, depth to rock.

See footnote at end of table.

TABLE 12.--WATER MANAGEMENT--Continued

Soil name and map symbol	Limitations for--			Features affecting--		
	Pond reservoir areas	Embankments, dikes, and levees	Aquifer-fed excavated ponds	Drainage	Irrigation	Grassed waterways
Cb*: Carbondale-----	Severe: seepage.	Severe: excess humus, ponding.	Severe: slow refill.	Ponding, subsides, frost action.	Ponding-----	Wetness.
Lupton-----	Severe: seepage.	Severe: excess humus, ponding.	Severe: slow refill.	Ponding, subsides, frost action.	Ponding, soil blowing.	Wetness.
Rifle-----	Severe: seepage.	Severe: excess humus, ponding.	Moderate: slow refill.	Ponding, frost action.	Ponding-----	Wetness.
Ch----- Cathro	Severe: seepage.	Severe: piping, ponding.	Severe: slow refill.	Ponding, subsides, frost action.	Ponding, soil blowing.	Wetness.
Ck*: Cathro-----	Severe: seepage.	Severe: piping, ponding.	Severe: slow refill.	Ponding, subsides, frost action.	Ponding, soil blowing.	Wetness.
Tacoosh-----	Severe: seepage.	Severe: excess humus, ponding.	Severe: slow refill.	Ponding, subsides, frost action.	Ponding, soil blowing.	Wetness.
ClA----- Charlevoix	Severe: seepage.	Severe: seepage, piping, wetness.	Moderate: slow refill.	Frost action---	Wetness, droughty.	Wetness, droughty.
CmA----- Chatham	Severe: seepage.	Severe: seepage, large stones.	Severe: no water.	Deep to water	Large stones, droughty.	Large stones, droughty.
CmB----- Chatham	Severe: seepage.	Severe: seepage, large stones.	Severe: no water.	Deep to water	Slope, large stones, droughty.	Large stones, droughty.
CmD----- Chatham	Severe: seepage, slope.	Severe: seepage, large stones.	Severe: no water.	Deep to water	Slope, large stones, droughty.	Large stones, slope, droughty.
Cn----- Chippeny	Moderate: seepage, depth to rock.	Severe: excess humus, ponding.	Severe: slow refill, depth to rock, cutbanks cave.	Ponding, percs slowly, depth to rock.	Ponding, soil blowing, percs slowly.	Wetness, depth to rock, rooting depth.
CrA----- Croswell	Severe: seepage.	Severe: seepage, piping.	Severe: cutbanks cave.	Cutbanks cave	Wetness, droughty.	Droughty.
Da----- Dawson	Severe: seepage.	Severe: excess humus, ponding.	Severe: slow refill, cutbanks cave.	Ponding, subsides, frost action.	Ponding, rooting depth.	Wetness, rooting depth.
Dd*: Dawson-----	Severe: seepage.	Severe: excess humus, ponding.	Severe: slow refill, cutbanks cave.	Ponding, subsides, frost action.	Ponding, rooting depth.	Wetness, rooting depth.

See footnote at end of table.

TABLE 12.--WATER MANAGEMENT--Continued

Soil name and map symbol	Limitations for--			Features affecting--		
	Pond reservoir areas	Embankments, dikes, and levees	Aquifer-fed excavated ponds	Drainage	Irrigation	Grassed waterways
Dd*: Greenwood-----	Severe: seepage.	Severe: excess humus, ponding.	Moderate: slow refill.	Ponding, frost action.	Ponding-----	Wetness.
DeB----- Deerton	Severe: seepage.	Severe: seepage, piping.	Severe: no water.	Deep to water	Slope, droughty, fast intake.	Droughty, depth to rock.
DeD----- Deerton	Severe: seepage, slope.	Severe: seepage, piping.	Severe: no water.	Deep to water	Slope, droughty, fast intake.	Slope, droughty, depth to rock.
D1B*: Deerton-----	Severe: seepage.	Severe: seepage, piping.	Severe: no water.	Deep to water	Slope, droughty, fast intake.	Droughty, depth to rock.
Burt-----	Severe: depth to rock.	Severe: thin layer, seepage, piping.	Severe: depth to rock, cutbanks cave.	Ponding, depth to rock, cutbanks cave.	Ponding, fast intake, soil blowing.	Wetness, droughty, depth to rock.
Dm----- Deford	Severe: seepage.	Severe: seepage, piping, ponding.	Severe: cutbanks cave.	Ponding, cutbanks cave.	Ponding, droughty, fast intake.	Wetness, droughty.
DuB----- Dual	Severe: seepage.	Severe: seepage, piping.	Severe: no water.	Deep to water	Slope, droughty, fast intake.	Droughty, depth to rock.
EaB----- Springlake	Severe: seepage.	Severe: seepage.	Severe: no water.	Deep to water	Slope, droughty, fast intake.	Droughty.
EcB----- Adams	Severe: seepage.	Severe: seepage, piping.	Severe: no water.	Deep to water	Slope, droughty, fast intake.	Droughty.
EcD----- Adams	Severe: seepage, slope.	Severe: seepage, piping.	Severe: no water.	Deep to water	Slope, droughty, fast intake.	Slope, droughty.
EdB----- Eastport	Severe: seepage.	Severe: seepage, piping.	Severe: no water.	Deep to water	Slope, droughty, fast intake.	Droughty.
EeB*: Eastport-----	Severe: seepage.	Severe: seepage, piping.	Severe: no water.	Deep to water	Slope, droughty, fast intake.	Droughty.
Roscommon-----	Severe: seepage.	Severe: seepage, piping, ponding.	Severe: cutbanks cave.	Ponding, cutbanks cave.	Ponding, droughty, fast intake.	Wetness, droughty.
EmA----- Emmet	Severe: seepage.	Severe: piping.	Severe: no water.	Deep to water	Rooting depth	Rooting depth.

See footnote at end of table.

TABLE 12.--WATER MANAGEMENT--Continued

Soil name and map symbol	Limitations for--			Features affecting--		
	Pond reservoir areas	Embankments, dikes, and levees	Aquifer-fed excavated ponds	Drainage	Irrigation	Grassed waterways
EmB----- Emmet	Severe: seepage.	Severe: piping.	Severe: no water.	Deep to water	Slope, rooting depth.	Rooting depth.
EmC----- Emmet	Severe: seepage, slope.	Severe: piping.	Severe: no water.	Deep to water	Slope, rooting depth.	Slope, rooting depth.
EnA----- Ensign	Severe: depth to rock.	Severe: piping, wetness.	Severe: depth to rock.	Depth to rock, frost action.	Wetness, soil blowing.	Wetness, depth to rock.
Es*: Ensley-----	Severe: seepage.	Severe: piping, piping, ponding.	Moderate: slow refill.	Ponding, frost action.	Ponding, soil blowing.	Wetness.
Angelica-----	Slight-----	Severe: piping, ponding.	Severe: slow refill.	Ponding, frost action.	Ponding, rooting depth.	Wetness, rooting depth.
FaA----- Fairport	Moderate: seepage, depth to rock.	Severe: thin layer.	Severe: no water.	Deep to water	Depth to rock	Depth to rock.
FaB----- Fairport	Moderate: seepage, depth to rock, slope.	Severe: thin layer.	Severe: no water.	Deep to water	Slope, depth to rock.	Depth to rock.
GcB----- Gilchrist	Severe: seepage.	Severe: piping.	Severe: cutbanks cave.	Slope-----	Slope, wetness, droughty.	Droughty.
GrB----- Grayling	Severe: seepage.	Severe: seepage, piping.	Severe: no water.	Deep to water	Slope, droughty, fast intake.	Droughty.
GrD----- Grayling	Severe: seepage, slope.	Severe: seepage, piping.	Severe: no water.	Deep to water	Slope, droughty, fast intake.	Slope, droughty.
Gw----- Greenwood	Severe: seepage.	Severe: excess humus, ponding.	Moderate: slow refill.	Ponding, frost action.	Ponding-----	Wetness.
IoB----- Iosco	Severe: seepage.	Severe: seepage, piping, wetness.	Severe: slow refill, cutbanks cave.	Slope, cutbanks cave.	Slope, wetness, droughty.	Wetness, erodes easily, droughty.
KaB----- Kalkaska	Severe: seepage.	Severe: seepage, piping.	Severe: no water.	Deep to water	Slope, droughty, fast intake.	Droughty.
KaD, KaE----- Kalkaska	Severe: seepage, slope.	Severe: seepage, piping.	Severe: no water.	Deep to water	Slope, droughty, fast intake.	Slope, droughty.

See footnote at end of table.

TABLE 12.--WATER MANAGEMENT--Continued

Soil name and map symbol	Limitations for--			Features affecting--		
	Pond reservoir areas	Embankments, dikes, and levees	Aquifer-fed excavated ponds	Drainage	Irrigation	Grassed waterways
KdB----- Karlin	Severe: seepage.	Severe: seepage, piping.	Severe: no water.	Deep to water	Slope, droughty.	Droughty.
KdD----- Karlin	Severe: seepage, slope.	Severe: seepage, piping.	Severe: no water.	Deep to water	Slope, droughty.	Slope, droughty.
KgC----- Kawbawgam	Severe: seepage.	Severe: piping, wetness.	Severe: depth to rock, depth to rock.	Depth to rock, frost action, slope.	Slope, wetness, droughty.	Wetness, droughty.
KlA----- Kawkawlin	Slight-----	Severe: wetness.	Severe: slow refill.	Percs slowly, frost action.	Wetness-----	Wetness, erodes easily, percs slowly.
KnB----- Keweenaw	Severe: seepage.	Severe: seepage, piping.	Severe: no water.	Deep to water	Slope, droughty, fast intake.	Large stones, droughty.
KnD----- Keweenaw	Severe: seepage, slope.	Severe: seepage, piping.	Severe: no water.	Deep to water	Slope, droughty, fast intake.	Large stones, slope, droughty.
Kr----- Kinross	Severe: seepage.	Severe: seepage, piping, ponding.	Severe: cutbanks cave.	Ponding, cutbanks cave.	Ponding, droughty, fast intake.	Wetness, droughty.
KsB----- Kiva	Severe: seepage.	Severe: seepage.	Severe: no water.	Deep to water	Slope, droughty.	Large stones, droughty.
KsD----- Kiva	Severe: seepage, slope.	Severe: seepage.	Severe: no water.	Deep to water	Slope, droughty.	Large stones, slope, droughty.
Lb*. Lake beaches						
Lm*. Limestone rock land						
LoA----- Longrie	Moderate: seepage, depth to rock.	Severe: piping.	Severe: no water.	Deep to water	Droughty, depth to rock.	Large stones, erodes easily.
LoB----- Longrie	Moderate: seepage, depth to rock, slope.	Severe: piping.	Severe: no water.	Deep to water	Slope, droughty, depth to rock.	Large stones, erodes easily.
LsD*: Longrie-----	Severe: slope.	Severe: piping.	Severe: no water.	Deep to water	Slope, droughty, depth to rock.	Large stones, slope, erodes easily.
Summerville-----	Severe: depth to rock, slope.	Severe: piping.	Severe: no water.	Deep to water	Slope, droughty, depth to rock.	Slope, droughty, depth to rock.

See footnote at end of table.

TABLE 12.--WATER MANAGEMENT--Continued

Soil name and map symbol	Limitations for--			Features affecting--		
	Pond reservoir areas	Embankments, dikes, and levees	Aquifer-fed excavated ponds	Drainage	Irrigation	Grassed waterways
Ma*. Made land						
McB----- Mancelona	Severe: seepage.	Severe: seepage.	Severe: no water.	Deep to water	Slope, droughty, fast intake.	Droughty.
McD----- Mancelona	Severe: seepage, slope.	Severe: seepage.	Severe: no water.	Deep to water	Slope, droughty, fast intake.	Slope, droughty.
Mh*. Marsh						
MlB----- Melita	Severe: seepage.	Severe: seepage, piping.	Severe: no water.	Deep to water	Slope, droughty, fast intake.	Droughty.
MnB----- Menominee	Severe: seepage.	Severe: seepage, piping.	Severe: no water.	Deep to water	Slope, droughty, fast intake.	Droughty.
MnD----- Menominee	Severe: seepage, slope.	Severe: seepage, piping.	Severe: no water.	Deep to water	Slope, droughty, fast intake.	Slope, droughty.
MuB----- Munising	Moderate: seepage, slope.	Severe: seepage, piping.	Severe: no water.	Percs slowly, slope, cutbanks cave.	Slope, wetness, droughty.	Wetness, droughty.
MuD----- Munising	Severe: slope.	Severe: seepage, piping.	Severe: no water.	Percs slowly, slope, cutbanks cave.	Slope, wetness, droughty.	Wetness, slope, droughty.
MuE----- Munising	Severe: slope.	Severe: seepage, piping.	Severe: no water.	Deep to water	Slope, droughty.	Slope, droughty, rooting depth.
Nh----- Nahma	Moderate: seepage, depth to rock.	Severe: piping, ponding.	Severe: depth to rock.	Ponding, depth to rock.	Ponding, soil blowing, frost action.	Large stones, wetness, depth to rock.
NsA----- Nester	Slight-----	Moderate: wetness.	Severe: no water.	Percs slowly---	Wetness-----	Percs slowly.
NsB----- Nester	Moderate: slope.	Slight-----	Severe: no water.	Deep to water	Slope, percs slowly.	Percs slowly.
OnA----- Onaway	Moderate: seepage.	Severe: seepage, piping.	Severe: slow refill.	Favorable-----	Soil blowing, wetness.	Large stones, rooting depth.
OnB----- Onaway	Moderate: slope.	Severe: seepage, piping.	Severe: no water.	Deep to water	Slope, soil blowing.	Large stones.
OnC, OnD----- Onaway	Severe: slope.	Severe: seepage, piping.	Severe: no water.	Deep to water	Slope, soil blowing.	Large stones, slope.

See footnote at end of table.

TABLE 12.--WATER MANAGEMENT--Continued

Soil name and map symbol	Limitations for--			Features affecting--		
	Pond reservoir areas	Embankments, dikes, and levees	Aquifer-fed excavated ponds	Drainage	Irrigation	Grassed waterways
OoE*: Onota-----	Severe: seepage, slope.	Severe: piping.	Severe: no water.	Deep to water	Slope, soil blowing.	Slope, depth to rock.
Chippeny-----	Moderate: seepage, depth to rock.	Severe: excess humus, piping.	Severe: slow refill, depth to rock.	Ponding, percs slowly, depth to rock.	Ponding, soil blowing, percs slowly.	Wetness, depth to rock, rooting depth.
OrB*: Onota-----	Severe: seepage.	Severe: piping.	Severe: no water.	Deep to water	Slope, soil blowing.	Depth to rock.
Deerton-----	Severe: seepage.	Severe: seepage, piping.	Severe: no water.	Deep to water	Slope, droughty, fast intake.	Droughty, depth to rock.
OrD*: Onota-----	Severe: seepage, slope.	Severe: piping.	Severe: no water.	Deep to water	Slope, soil blowing.	Slope, depth to rock.
Deerton-----	Severe: seepage, slope.	Severe: seepage, piping.	Severe: no water.	Deep to water	Slope, droughty, fast intake.	Slope, droughty, depth to rock.
OtB----- Otisco	Severe: seepage.	Severe: seepage, piping, wetness.	Severe: cutbanks cave.	Slope, cutbanks cave.	Slope, wetness, droughty.	Wetness, droughty.
Pc----- Pickford	Slight-----	Severe: ponding.	Severe: no water.	Ponding, percs slowly, frost action.	Ponding-----	Wetness, erodes easily, percs slowly.
PfA----- Algonquin	Slight-----	Severe: wetness.	Severe: no water.	Percs slowly, frost action.	Wetness, percs slowly.	Wetness, erodes easily, percs slowly.
PkA*: Algonquin-----	Slight-----	Severe: wetness.	Severe: no water.	Percs slowly, frost action.	Wetness, percs slowly.	Wetness, erodes easily, percs slowly.
Pickford-----	Slight-----	Severe: ponding.	Severe: no water.	Ponding, percs slowly, frost action.	Ponding-----	Wetness, erodes easily, percs slowly.
Rc----- Roscommon	Severe: seepage.	Severe: seepage, piping, ponding.	Severe: cutbanks cave.	Ponding, cutbanks cave.	Ponding, droughty, fast intake.	Wetness, droughty.
RkB*: Roscommon-----	Severe: seepage.	Severe: seepage, piping, ponding.	Severe: cutbanks cave.	Ponding, cutbanks cave.	Ponding, droughty, fast intake.	Wetness, droughty.

See footnote at end of table.

TABLE 12. --WATER MANAGEMENT--Continued

Soil name and map symbol	Limitations for--			Features affecting--		
	Pond reservoir areas	Embankments, dikes, and levees	Aquifer-fed excavated ponds	Drainage	Irrigation	Grassed waterways
RkB*: Kalkaska-----	Severe: seepage.	Severe: seepage, piping.	Severe: no water.	Deep to water	Slope, droughty, fast intake.	Droughty.
RoB----- Rousseau	Severe: seepage.	Severe: seepage, piping.	Severe: no water.	Deep to water	Slope, droughty, fast intake.	Droughty.
RoD, RsD----- Rousseau	Severe: seepage, slope.	Severe: seepage, piping.	Severe: no water.	Deep to water	Slope, droughty, fast intake.	Slope, droughty.
RuB----- Rubicon	Severe: seepage.	Severe: seepage, piping.	Severe: no water.	Deep to water	Slope, droughty, fast intake.	Droughty.
RuD, RuE----- Rubicon	Severe: seepage, slope.	Severe: seepage, piping.	Severe: no water.	Deep to water	Slope, droughty, fast intake.	Slope, droughty.
Rv----- Ruse	Severe: depth to rock.	Severe: piping, ponding.	Severe: depth to rock.	Ponding, depth to rock, frost action.	Ponding, depth to rock.	Wetness, depth to rock, erodes easily.
ScA----- Finch	Severe: seepage, cemented pan.	Severe: seepage, piping, wetness.	Severe: no water.	Cemented pan, cutbanks cave.	Wetness, droughty.	Wetness, droughty, cemented pan.
ShB----- Sheldrake	Severe: seepage.	Severe: seepage, piping.	Severe: no water.	Deep to water	Slope, droughty, fast intake.	Droughty.
SkB----- Skaneee	Moderate: seepage, slope.	Severe: piping, wetness.	Severe: no water.	Percs slowly, frost action, slope.	Slope, wetness, droughty.	Wetness, droughty, rooting depth.
StB----- Steuben	Severe: seepage.	Severe: seepage, piping.	Severe: no water.	Percs slowly, slope, cutbanks cave.	Slope, wetness, droughty.	Wetness, droughty.
StD----- Steuben	Severe: seepage, slope.	Severe: seepage, piping.	Severe: no water.	Percs slowly, slope, cutbanks cave.	Slope, wetness, droughty.	Wetness, slope, droughty.
SuA----- Summerville	Severe: depth to rock.	Severe: piping.	Severe: no water.	Deep to water	Droughty, depth to rock.	Droughty, depth to rock.
SvA----- Sundell	Moderate: seepage, depth to rock.	Severe: piping, wetness.	Severe: depth to rock.	Depth to rock, frost action.	Wetness, soil blowing.	Wetness, depth to rock.
SwA----- Sundell variant	Severe: seepage.	Severe: piping, wetness.	Severe: depth to rock, cutbanks cave.	Depth to rock, cutbanks cave.	Wetness, droughty.	Wetness, droughty, depth to rock.
Ta----- Tawas	Severe: seepage.	Severe: seepage, piping, ponding.	Severe: slow refill, piping, ponding.	Ponding, subsides, cutbanks cave.	Ponding, soil blowing.	Wetness.

See footnote at end of table.

TABLE 12.--WATER MANAGEMENT--Continued

Soil name and map symbol	Limitations for--			Features affecting--		
	Pond reservoir areas	Embankments, dikes, and levees	Aquifer-fed excavated ponds	Drainage	Irrigation	Grassed waterways
TrA----- Trenary	Moderate: seepage.	Severe: piping.	Severe: cutbanks cave.	Favorable-----	Wetness, soil blowing.	Rooting depth.
TrB----- Trenary	Moderate: seepage, slope.	Severe: piping.	Severe: no water.	Deep to water	Slope, soil blowing, rooting depth.	Rooting depth.
TrC, TrD----- Trenary	Severe: slope.	Severe: piping.	Severe: no water.	Deep to water	Slope, soil blowing, rooting depth.	Slope, rooting depth.
WaA----- Wainola	Severe: seepage.	Severe: seepage, piping, wetness.	Severe: cutbanks cave.	Cutbanks cave	Wetness, droughty.	Wetness, droughty.
WlB----- Wallace	Severe: seepage, cemented pan.	Severe: seepage, piping.	Severe: no water.	Deep to water	Slope, droughty, fast intake.	Droughty, cemented pan.
WlD----- Wallace	Severe: seepage, cemented pan, slope.	Severe: seepage, piping.	Severe: no water.	Deep to water	Slope, droughty, fast intake.	Slope, droughty, cemented pan.
Wm----- Wheatley	Severe: seepage.	Severe: seepage, ponding.	Severe: cutbanks cave.	Ponding, cutbanks cave.	Ponding, droughty, fast intake.	Wetness, droughty.
YalB----- Yalmer	Severe: seepage.	Severe: piping.	Severe: no water.	Percs slowly, slope.	Slope, wetness, droughty.	Droughty, rooting depth.
YalD----- Yalmer	Severe: seepage, slope.	Severe: piping.	Severe: no water.	Percs slowly, slope.	Slope, wetness, droughty.	Slope, droughty, rooting depth.

* See description of the map unit for composition and behavior characteristics of the map unit.

TABLE 13.--ENGINEERING INDEX PROPERTIES

(The symbol < means less than; > means more than. Absence of an entry indicates that data were not estimated)

Soil name and map symbol	Depth	USDA texture	Classification		Frag- ments inches	Frag- ments inches	Percentage passing				Liquid limit	Plas- ticity index	
			Unified	AASHTO			> 10	3-10	4	10	40		
			In		Pct	Pct						Pct	
Ad*----- Alluvial land	0-60	Variable-----	---	---	---	---	---	---	---	---	---	---	---
AlC----- Alpena	0-7	Gravelly sandy loam.	SM, SC-SM	A-2-4, A-1	0	0-10	75-90	50-75	35-55	15-35	15-25	NP-7	
	7-60	Stratified extremely gravelly sand to sand.	SP, SP-SM, GP, GP-GM	A-1	0	0-20	35-65	10-50	5-35	0-10	---	NP	
AuB----- Au Gres	0-8	Sand-----	SM, SP-SM, SP	A-2-4, A-3, A-1-b	0	0	95-100	75-100	35-70	0-15	---	NP	
	8-27	Sand-----	SP-SM, SM, SC-SM, SP	A-2-4, A-3, A-1-b	0	0	95-100	75-100	35-70	0-15	<25	NP-7	
	27-60	Sand-----	SP-SM, SM, SP	A-3, A-2-4, A-1-b	0	0	95-100	75-100	35-70	0-15	---	NP	
AvA----- Battlefield	0-10	Loamy sand---	SP-SM, SM, SC-SM	A-2, A-1	0	0-5	90-100	75-100	35-75	10-30	<25	NP-7	
	10-20	Sand, loamy sand.	SP, SP-SM, SM, SC-SM	A-2-4, A-3, A-1	0	0-5	90-100	70-100	35-75	0-30	<25	NP-7	
	20-60	Gravelly sand, very gravelly sand, very gravelly coarse sand.	SP, SW, SW-SM, SP-SM	A-1, A-2-4, A-3	0	0-10	70-90	50-75	25-55	0-10	---	NP	
B1B, B1D, B1E- Blue Lake	0-10	Sand-----	SM, SP-SM	A-2-4, A-3, A-1-b	0	0-5	95-100	85-100	40-70	5-15	---	NP	
	10-25	Loamy sand, sand.	SP-SM, SM	A-2-4, A-3, A-1-b	0	0-5	95-100	85-100	40-75	5-30	---	NP	
	25-32	Stratified sand to fine sandy loam.	SP-SM, SM	A-2-4, A-4, A-3, A-1	0	0-5	95-100	85-100	40-85	5-50	---	NP	
	32-60	Sand-----	SP-SM, SM	A-3, A-2-4, A-1-b	0	0-5	95-100	85-100	40-75	5-15	---	NP	

See footnote at end of table.

TABLE 13.--ENGINEERING INDEX PROPERTIES--Continued

Soil name and map symbol	Depth	USDA texture	Classification		Frag- ments inches	Frag- ments inches	Percentage passing			Liquid limit	Plas- ticity index	
			Unified	AASHTO			> 10 inches	3-10 inches	4	10		
	In				Pct	Pct					Pct	
BoB, BoD----- Bohemian	0-5	Fine sandy loam.	ML, SM, SC-SM, CL-ML	A-4	0	0	100	100	70-85	40-60	<25	NP-7
	5-17	Very fine sandy loam, fine sandy loam, silt loam.	ML, CL, CL-ML	A-4	0	0	100	100	70-95	50-65	<30	NP-10
	17-28	Fine sandy loam, silt loam.	CL	A-4, A-6	0	0	100	100	70-95	50-90	25-35	9-15
	28-60	Stratified fine sand to clay.	CL-ML, CL, SM, SC-SM	A-4, A-6, A-2-4	0	0	100	100	70-95	30-90	20-40	4-20
Bp*. Borrow pits												
BrA----- Bowers	0-7	Silt loam-----	CL	A-6, A-4	0	0	100	100	85-100	70-90	25-40	7-16
	7-11	Silt loam-----	CL	A-6, A-4	0	0	100	100	90-100	70-90	25-40	7-16
	11-18	Silty clay loam, clay loam.	CL	A-7	0	0	100	100	90-100	70-95	40-50	20-25
	18-60	Stratified silt to clay.	CL	A-6, A-7	0	0	100	100	90-100	70-95	35-50	15-25
Bs----- Brevort	0-8	Mucky loamy sand.	SP-SM, SM, SC-SM	A-1-b, A-2-4	0-5	0-8	85-100	75-100	35-75	10-30	<25	NP-7
	8-30	Sand, loamy sand.	SM, SP-SM, SC-SM	A-2-4, A-3, A-1-b	0	0-8	85-100	75-100	35-85	5-30	<20	NP-7
	30-60	Loam, silt loam.	CL, CL-ML, SC, SC-SM	A-4, A-6, A-2	0	0-8	85-100	75-100	65-100	45-95	20-35	5-15
BtA----- Brimley	0-8	Fine sandy loam.	SM, ML, SC, CL	A-4	0	0	100	100	70-85	40-55	20-30	3-11
	8-17	Very fine sandy loam, silt loam, loam.	CL, ML	A-4, A-6	0	0	100	100	85-95	50-65	20-30	3-11
	17-22	Silty clay loam, silt loam.	CL	A-4, A-6, A-7	0	0	100	100	90-100	70-90	30-45	9-22
	22-60	Stratified fine sand to silt loam.	ML, SM, SC, CL	A-4, A-6	0	0	100	100	70-95	40-90	20-40	3-18
Bu----- Bruce variant	0-5	Mucky fine sandy loam.	SM, ML	A-4	0	0	100	100	70-85	40-55	<20	NP-4
	5-13	Very fine sandy loam, loamy very fine sand.	SM, ML	A-4	0	0	100	100	70-95	40-65	<20	NP-4
	13-60	Stratified very fine sand to silt.	SM, ML	A-4, A-2-4	0	0	100	100	55-95	30-95	<20	NP-4

See footnote at end of table.

TABLE 13.--ENGINEERING INDEX PROPERTIES--Continued

Soil name and map symbol	Depth	USDA texture	Classification		Frag- ments inches	Frag- ments inches	Percentage passing sieve number--			Liquid limit	Plas- ticity index	
			Unified	AASHTO			> 10 inches	3-10 inches	4	10		
	In				Pct	Pct					Pct	
BwC-- Burt	0-5	Mucky sandy loam.	SM	A-2-4	0	0-10	95-100	85-100	50-70	25-40	<20	NP-4
	5-17	Sand, loamy sand.	SP-SM, SM	A-3, A-2, A-1-b	0	0-10	95-100	85-100	40-75	5-30	---	NP
	17	Unweathered bedrock.	---	---	---	---	---	---	---	---	---	---
Cb*: Carbondale--	0-4	Mucky peat----	PT	A-8	0	0	---	---	---	---	---	---
	4-32	Muck-----	PT	A-8	0	0	---	---	---	---	---	---
	32-60	Mucky peat---	PT	A-8	0	0	---	---	---	---	---	---
Lupton-----	0-46	Muck-----	PT	A-8	0	0	---	---	---	---	---	---
	46-60	Muck-----	PT	A-8	0	0	---	---	---	---	---	---
Rifle-----	0-4	Peat-----	PT	A-8	0	0	---	---	---	---	---	---
	4-60	Mucky peat---	PT	A-8	0	0	---	---	---	---	---	---
Ch----- Cathro	0-11	Muck-----	PT	A-8	0	0	---	---	---	---	---	---
	11-23	Muck-----	PT	A-8	0	0	---	---	---	---	---	---
	23-60	Loam, clay loam, sandy loam.	SC-SM, CL-ML, SC, CL	A-4, A-6	0	0-5	80-100	75-100	45-80	20-80	20-40	4-20
Ck*: Cathro-----	0-11	Muck-----	PT	A-8	0	0	---	---	---	---	---	---
	11-23	Muck-----	PT	A-8	0	0	---	---	---	---	---	---
	23-60	Loam, clay loam, sandy loam.	SC-SM, CL-ML, SC, CL	A-4, A-6	0	0-5	80-100	75-100	45-80	20-80	20-40	4-20
Tacoosh-----	0-8	Muck-----	PT	A-8	0	0-10	---	---	---	---	---	---
	8-40	Mucky peat---	PT	A-8	0-5	0-10	---	---	---	---	---	---
	40-60	Sandy loam, loam.	SM, ML, SC, CL	A-2, A-4, A-6	0-5	0-10	85-100	85-95	50-95	25-75	15-35	NP-20
ClA----- Charlevoix	0-7	Sandy loam---	SM, SC-SM	A-2-4, A-4, A-1-b	0	0-5	90-100	75-100	45-70	20-40	<25	2-7
	7-19	Sandy loam, loam.	SC, SC-SM, CL, CL-ML	A-2-4, A-4, A-1-b	0	0-5	90-100	75-100	50-95	20-75	20-30	4-10
	19-29	Sandy clay loam, loam, sandy loam.	CL-ML, SC, SC-SM, CL	A-6, A-4, A-2, A-7	0	0-5	90-100	75-100	45-95	20-75	25-45	7-20
	29-60	Sandy loam---	SC, SC-SM, SM	A-4, A-2-4, A-1-b	0	0-5	85-95	75-95	45-70	20-40	<30	NP-10
	60-100											
CmA, CmB, CmD- Chatham	0-13	Fine sandy loam.	SM, ML, CL-ML, SC-SM	A-4, A-2	0	0-15	90-100	85-100	60-85	30-55	<25	NP-7
	13-23	Sandy loam, fine sandy loam.	SM, SC, SC-SM, ML	A-2-4, A-4	0	0-15	90-100	85-100	50-90	25-70	<25	NP-10
	23-60	Gravely loamy sand, gravelly sandy loam.	SM, SP-SM	A-1, A-3, A-2-4	0-20	30-70	80-90	50-75	30-65	5-20	---	NP

See footnote at end of table.

TABLE 13.--ENGINEERING INDEX PROPERTIES--Continued

Soil name and map symbol	Depth	USDA texture	Classification		Frag- ments inches	Frag- ments inches	Percentage passing				Liquid limit	Plas- ticity index
			Unified	AASHTO			> 10	3-10	4	10	40	
			In		Pct	Pct						Pct
Cn-----	0-20	Muck-----	PT		---	---	---	---	---	---	---	---
Chippeny	20-28	Silty clay loam, sandy loam.	SC-SM, CL-ML, GM-GC	A-2, A-4, A-6, A-1-a	0-5	0-30	45-100	75-100	35-100	10-90	<50	NP-30
	28	Unweathered bedrock.		---	---	---	---	---	---	---	---	---
CrA-----	0-5	Sand-----	SP-SM, SM	A-3, A-2-4, A-1-b	0	0	90-100	75-100	40-70	5-15	---	NP
	5-28	Sand-----	SP-SM, SM, SP	A-3, A-2-4, A-1-b	0	0	90-100	75-100	40-70	3-15	---	NP
	28-60	Sand-----	SP-SM, SM, SP	A-3, A-2-4, A-1-b	0	0	90-100	75-100	40-70	3-15	---	NP
Da-----	0-8	Peat-----	PT	A-8	0	0	---	---	---	---	---	---
	8-38	Muck-----	PT	A-8	0	0	---	---	---	---	---	---
	38-40	Silt loam----	ML, CL-ML	A-4	0	0	100	100	45-100	5-80	<20	NP-5
	40-60	Sand, loamy sand.	SP, SM, SC, GP	A-2, A-3, A-1, A-4	0	0	95-100	75-100	35-75	5-30	<20	NP-10
Dd*: Dawson-----												
	0-8	Peat-----	PT	A-8	0	0	---	---	---	---	---	---
	8-38	Muck-----	PT	A-8	0	0	---	---	---	---	---	---
	38-40	Silt loam----	ML, CL-ML	A-4	0	0	100	100	45-100	5-80	<20	NP-5
	40-60	Sand, loamy sand.	SP, SM, SC, GP	A-2, A-3, A-1, A-4	0	0	95-100	75-100	35-75	5-30	<20	NP-10
Greenwood---	0-10	Peat-----	PT	A-8	0	0	---	---	---	---	---	---
	10-60	Mucky peat---	PT	A-8	0	0	---	---	---	---	---	---
DeB, DeD-----	0-8	Sand-----	SM, SP-SM	A-1-b, A-2-4, A-3	0	0-5	95-100	90-100	45-70	5-15	---	NP
	8-24	Sand, loamy sand.	SM, SP, SP-SM	A-1-b, A-2-4, A-3	0	0-10	85-100	80-95	40-75	4-30	---	NP
	24-38	Weathered bedrock.			---	---	---	---	---	---	---	---
	38	Unweathered bedrock.			---	---	---	---	---	---	---	---
DLB*: Deerton-----	0-8	Sand-----	SM, SP-SM	A-1-b, A-2-4, A-3	0	0-5	95-100	90-100	45-70	5-15	---	NP
	8-24	Sand, loamy sand.	SM, SP, SP-SM	A-1-b, A-2-4, A-3	0	0-10	85-100	80-95	40-75	4-30	---	NP
	24-38	Weathered bedrock.			---	---	---	---	---	---	---	---
	38	Unweathered bedrock.			---	---	---	---	---	---	---	---

See footnote at end of table.

TABLE 13.--ENGINEERING INDEX PROPERTIES--Continued

Soil name and map symbol	Depth	USDA texture	Classification		Frag- ments inches	Frag- ments inches	Percentage passing sieve number--				Liquid limit	Plas- ticity index
			Unified	AASHTO			> 10 inches	3-10 inches	4	10	40	200
	In				Pct	Pct						Pct
D1B*: Burt-----	0-5	Mucky loamy sand.	SP-SM, SM	A-2-4, A-1-b	0	0-10	95-100	85-100	40-75	10-30	---	NP
	5-17	Sand, loamy sand.	SP-SM, SM	A-3, A-2, A-1-b	0	0-10	95-100	85-100	40-75	5-30	---	NP
	17	Unweathered bedrock.	---	---	---	---	---	---	---	---	---	---
Dm----- Deford	0-3	Loamy fine sand.	SP-SM, SM	A-3, A-2-4	0	0	100	100	50-70	5-15	---	NP-4
	3-60	Fine sand, loamy fine sand.	SM, SP-SM, SP	A-2-4, A-3	0	0	100	100	50-80	20-50	15-20	NP-4
DuB----- Duel	0-6	Loamy sand----	SM	A-2-4, A-1-b	0	0	95-100	95-100	45-75	15-30	---	NP
	6-21	Loamy sand, sand.	SP-SM, SM, SC-SM	A-3, A-2-4, A-1-b	0	0	95-100	95-100	45-75	5-30	15-20	NP-5
	21-28	Sand, loamy sand, coarse sand.	SP-SM, SM, SC-SM	A-3, A-2-4, A-1-b	0	0	95-100	95-100	45-75	5-30	15-20	NP-5
	28-31	Loam, loamy sand, sandy loam.	SM, SC	A-2, A-4, A-1	0	0	80-95	75-95	35-75	10-40	15-35	NP-15
	31	Unweathered bedrock.	---	---	---	---	---	---	---	---	---	---
EaB----- Springlake	0-7	Sand-----	SM, SP-SM	A-2-4, A-3, A-1-b	0	0	95-100	75-100	35-70	5-15	15-20	NP-4
	7-36	Sand, loamy sand.	SM, SP-SM	A-2-4, A-1-b, A-3	0	0	95-100	75-100	35-75	5-30	15-20	NP-4
	36-60	Gravelly sand, very gravelly sand.	SP, SP-SM	A-3, A-2-4, A-1-b	0	0	70-90	50-75	40-60	0-10	---	NP
EcB, EcD----- Adams	0-5	Loamy sand----	SM, SP-SM	A-1, A-2, A-3, A-4	0	0	95-100	95-100	45-85	5-40	---	NP
	5-26	Loamy sand, sand, gravelly sand.	SP, SP-SM, SW-SM	A-1, A-2, A-3	0	0	80-100	70-100	35-75	0-10	---	NP
	26-60	Gravelly sand, very gravelly sand.	SP-SM, SW-SM, SP	A-1-b, A-2-4, A-3	---	0-1	40-85	25-75	25-55	0-10	---	NP
EdB----- Eastport	0-4	Sand-----	SP, SM, SP-SM	A-3, A-2-4, A-1-b	0	0	90-100	75-100	35-70	0-15	---	NP
	4-19	Sand-----	SP, SM, SP-SM	A-3, A-2-4, A-1-b	0	0	90-100	75-100	35-70	0-15	---	NP
	19-60	Sand-----	SP, SM, SP-SM	A-3, A-2-4, A-1-b	0	0	90-100	75-100	35-70	0-15	---	NP

See footnote at end of table.

TABLE 13.--ENGINEERING INDEX PROPERTIES--Continued

Soil name and map symbol	Depth	USDA texture	Classification		Frag- ments inches	Frag- ments inches	Percentage passing			Liquid limit	Plas- ticity index	
			Unified	AASHTO			> 10 inches	3-10 inches	4	10		
			In		Pct	Pct				Pct		
EeB*: Eastport-----	0-4	Sand-----	SP, SM, SP-SM	A-3, A-2-4, A-1-b	0	0	90-100	75-100	35-70	0-15	---	NP
	4-19	Sand-----	SP, SM, SP-SM	A-3, A-2-4, A-1-b	0	0	90-100	75-100	35-70	0-15	---	NP
	19-60	Sand-----	SP, SM, SP-SM	A-3, A-2-4, A-1-b	0	0	90-100	75-100	35-70	0-15	---	NP
Roscommon----	0-4	Sand-----	SM, SP-SM	A-2, A-3, A-1	0	0	95-100	85-100	40-75	5-15	<20	NP-4
	4-60	Sand-----	SP, SP-SM	A-1, A-2, SM	0	0	95-100	85-100	40-75	0-15	<20	NP-4
EmA, EmB, EmC- Emmet	0-10	Sandy loam---	SM, SC-SM, SC	A-2, A-1-b, A-4	0	0-8	90-100	75-100	45-85	20-50	<25	NP-10
	10-26	Sandy loam, fine sandy loam.	SM, SC, SC-SM, SP-SM	A-2, A-1-b, A-4	0	0-8	95-100	75-100	45-85	20-55	<25	NP-10
	26-33	Loam, sandy clay loam.	SC-SM, CL, CL-ML, SC	A-2, A-4, A-6, A-1-b	0	0-8	95-100	75-100	60-90	25-75	20-40	5-20
	33-60	Sandy loam---	SM, SC-SM, SC	A-2, A-4, A-1-b	0	0-8	95-100	75-100	45-70	20-40	<25	NP-10
EnA----- Ensign	0-6	Fine sandy loam.	SC, CL, CL-ML, SC-SM	A-2-4, A-4	0	0-5	90-100	75-100	50-85	30-55	20-30	4-10
	6-17	Loam-----	CL-ML, CL, SC, SC-SM	A-2-4, A-4, A-6	0	0-5	90-100	60-100	45-95	25-75	20-35	5-15
	17	Unweathered bedrock.	---	---	---	---	---	---	---	---	---	---
Es*: Ensley-----	0-4	Sandy loam---	SM	A-2, A-4	0	0-10	90-100	75-100	45-75	25-50	<30	NP-4
	4-30	Sandy loam, sandy clay loam, loam.	SC, SC-SM, CL, CL-ML	A-6, A-4, A-2, A-1	0	0-10	90-100	75-100	45-90	20-75	20-35	4-15
	30-60	Sandy loam---	SC-SM, SM, SC	A-2, A-4, A-1	0	0-10	90-100	75-100	45-70	20-40	<30	2-9
Angelica-----	0-6	Loam-----	ML	A-4, A-6	0	0-10	90-100	85-100	75-95	55-75	25-40	2-13
	6-14	Loam, sandy loam, clay loam.	SM, ML, SC, CL	A-4, A-6	0	0-10	90-100	85-100	50-90	36-90	12-40	2-20
	14-17	Sandy clay loam, loam, clay loam.	SC, CL, SC-SM, CL-ML	A-2-4, A-6, A-4	0	0-10	90-100	85-100	70-100	25-90	15-40	5-23
	17-60	Sandy loam, loam, silt loam.	ML, SM, CL, SC	A-2-4, A-4, A-6	0	0-15	85-100	80-100	50-100	30-90	20-40	NP-16

See footnote at end of table.

TABLE 13.--ENGINEERING INDEX PROPERTIES--Continued

Soil name and map symbol	Depth	USDA texture	Classification		Frag- ments inches	Frag- ments inches	Percentage passing			Liquid limit	Plas- ticity index	
			Unified	AASHTO			> 10	3-10	4	10		
	In				Pct	Pct					Pct	
FaA, FaB----- Fairport	0-9	Silt loam---- loam, clay loam.	CL, CL-ML CL	A-4, A-6 A-6	0	0-2 0-5	85-95 85-100	75-95 75-100	70-95 70-100	55-90 50-90	20-30 25-40	6-11 10-25
	9-25	Silty clay loam, clay loam.										
	25-28	Loam, sandy clay loam, silty clay loam.	ML, CL, SM, SC	A-2, A-4, A-6	0	0-15	85-100	80-100	60-95	30-70	<30	2-15
	28	Unweathered bedrock.	---	---	---	---	---	---	---	---	---	---
GcB----- Gilchrist	0-5	Sand----- sand.	SP-SM, SM	A-2-4, A-3	0	0	95-100	95-100	50-70	5-15	---	NP
	5-30	Sand, loamy sand.	SP-SM, SM	A-2-4, A-3	0	0	95-100	95-100	50-70	5-20	---	NP
	30-60	Sandy loam----	SM	A-2-4, A-1-b	0	0-20	90-100	85-95	40-85	20-35	<20	NP-4
GrB, GrD----- Grayling	0-3	Sand----- SP	SM, SP-SM, A-1, A-2, A-3	0	0	95-100	90-100	45-70	3-15	---	NP	
	3-15	Sand----- SM	SP, SP-SM, A-1, A-2, A-3	0	0	95-100	90-100	45-70	3-15	---	NP	
	15-60	Sand----- SM	SP, SP-SM, A-1, A-2, A-3	0	0	95-100	90-100	40-70	0-15	---	NP	
Gw----- Greenwood	0-10	Peat----- PT	A-8	0	0	---	---	---	---	---	---	---
	10-60	Mucky peat---	PT	A-8	0	0	---	---	---	---	---	---
IoB----- Iosco	0-12	Sand----- sand.	SM, SP-SM SC-SM	A-2-4, A-3, A-1-b	0	0-8	90-100	75-100	35-70	5-15	---	NP
	12-29	Loamy sand, sand.	SP-SM	A-2-4, A-3, A-1-b	0	0-8	90-100	75-100	35-85	5-30	<25	NP-7
	29-60	Silty clay, clay loam, loam.	CL, CL-ML	A-4, A-6, A-7	0	0-8	90-100	85-100	70-95	50-90	25-45	5-25
KaB, KaD, KaE- Kalkaska	0-10	Sand----- A-1-b, A-2-4, A-3	SM, SP-SM	A-1-b, A-2-4, A-3	0	0-5	95-100	85-100	45-70	5-15	---	NP
	10-13	Sand----- A-2-4, A-3	SM, SP-SM	A-1-b, A-2-4, A-3	0	0-5	95-100	85-100	45-75	5-15	---	NP
	13-27	Sand----- A-2-4, A-3	SM, SP-SM	A-1-b, A-2-4, A-3	0	0-5	95-100	85-100	45-70	5-15	---	NP
	27-60	Sand----- SM	SP, SP-SM, A-1-b, A-2-4, A-3	A-1-b, A-2-4, A-3	0	0-5	95-100	85-100	45-70	0-15	---	NP
KdB, KdD----- Karlin	0-4	Sandy loam---	SM	A-4, A-1, A-2	0	0	90-100	75-100	45-70	20-40	<20	NP-4
	4-17	Loamy fine sand, fine sandy loam, sandy loam.	SP-SM, SM	A-2, A-4	0	0	90-100	75-100	50-95	30-50	<20	NP-4
	17-22	Loamy sand, fine sand.	SP, SP-SM, SM	A-2, A-3, A-1	0	0	90-100	75-100	35-80	15-35	---	NP
	22-60	Sand----- SM	SP, SP-SM, A-2, A-3, A-1	A-2, A-3, A-1	0	0	80-100	75-100	35-70	0-15	---	NP

See footnote at end of table.

TABLE 13.--ENGINEERING INDEX PROPERTIES--Continued

Soil name and map symbol	Depth	USDA texture	Classification		Frag- ments	Frag- ments	Percentage passing			Liquid limit	Plas- ticity index	
			Unified	AASHTO	> 10 inches	3-10 inches	4	10	40			
	In				Pct	Pct					Pct	
KgC----- Kawbawgam	0-6	Sandy loam----	SM, SC-SM	A-4, A-2-4	0	1-15	90-100	85-100	50-85	25-50	<25	NP-7
	6-24	Sandy loam----	SM, SC-SM	A-2-4, A-4	0	1-15	90-100	85-100	50-70	25-50	<25	NP-7
	24	Unweathered bedrock.	---	---	---	---	---	---	---	---	---	---
KlA----- Kawkawlin	0-10	Silt loam----	CL, ML, CL-ML	A-6, A-4	0	0-5	95-100	85-100	75-100	55-90	20-40	2-15
	10-21	Clay loam, silty clay loam.	CL	A-7, A-6	0	0-5	95-100	85-100	75-100	55-95	40-50	20-25
	21-60	Clay loam, silty clay loam.	CL	A-6, A-7	0	0-5	95-100	85-100	75-100	50-95	35-50	15-25
KnB, KnD----- Keweenaw	0-8	Loamy sand----	SM, SC, SC-SM,	A-2, A-1-b, SP-SM	0	0-10	90-100	75-100	35-85	10-40	<20	NP-10
				A-4								
	8-29	Loamy fine sand, loamy sand, sand.	SM, SC, SC-SM, SP-SM	A-2, A-1-b, A-4, A-3	0	0-25	85-100	75-100	30-85	5-45	<20	NP-10
	29-32	Sand, loamy sand.	SM, SC, SP-SM,	A-2, A-3, A-1-b,	0	0-25	85-100	75-100	35-75	5-45	<20	NP-10
				SC-SM A-4								
	32-39	Fine sandy loam, sandy loam.	SM, SC, SP-SM, SC-SM	A-2, A-3, A-1-b, A-4	0	0-25	85-100	75-100	50-85	20-50	<30	NP-10
	39-60	Loamy sand, sand.	SM, SC, SC-SM, SP-SM	A-2, A-1-b	0	0-25	85-100	75-100	30-75	10-30	<20	NP-10
Kr----- Kinross	0-4	Mucky sand----	SP-SM, SM	A-3, A-2-4	0	0	100	90-100	45-70	5-15	---	NP
	4-18	Sand-----	SP-SM, SM	A-3, A-2-4	0	0	100	90-100	45-70	5-15	---	NP
	18-60	Sand, fine sand.	SP-SM, SM	A-3, A-2-4	0	0	100	90-100	45-70	5-15	---	NP
KsB, KsD----- Kiva	0-5	Sandy loam----	SM, SC, SC-SM	A-2-4, A-4, A-1-b	0	0-10	85-100	75-95	45-80	20-50	<25	NP-10
	5-22	Sandy loam, gravelly sandy loam.	SC-SM, SC, CL-ML, CL	A-2-4, A-4, A-1-b	0	0-10	85-100	70-95	40-90	20-70	20-30	4-10
	22-60	Coarse sand, very gravelly sand, gravelly coarse sand.	SP-SM, SP, GP, GP-GM	A-1, A-3, A-2-4	0	15-40	50-90	40-80	20-60	0-10	---	NP
Lb*. Lake beaches												
Lm*. Limestone rock land												

See footnote at end of table.

TABLE 13.--ENGINEERING INDEX PROPERTIES--Continued

Soil name and map symbol	Depth	USDA texture	Classification		Frag- ments inches	Frag- ments inches	Percentage passing sieve number--				Liquid limit	Plas- ticity index	
			Unified	AASHTO			> 10 inches	3-10 inches	4	10	40	200	
	In						Pct	Pct					Pct
LoA, LoB----- Longrie	0-10	Sandy loam----	SM, SC-SM	A-2-4, A-4	0	0-25	95-100	85-100	50-85	25-50	<25	NP-7	
	10-24	Loam, sandy loam.	SC-SM, CL-ML, CL, SC	A-2-4, A-4, A-1-b	0	0-25	95-100	85-95	50-95	25-75	20-30	4-10	
	24-28	Loam, sandy loam.	SC-SM, SC, CL, CL-ML	A-4, A-2-4, A-1-b	0	0-25	95-100	70-90	40-90	20-70	20-30	4-10	
	28	Unweathered bedrock.	---	---	---	---	---	---	---	---	---	---	
LsD*: Longrie-----	0-10	Sandy loam----	SM, SC-SM	A-2-4, A-4	0	0-25	95-100	85-100	50-85	25-50	<25	NP-7	
	10-24	Loam, sandy loam.	SC-SM, CL-ML, CL, SC	A-2-4, A-4, A-1-b	0	0-25	95-100	85-95	50-95	25-75	20-30	4-10	
	24-28	Loam, sandy loam.	SC-SM, SC, CL, CL-ML	A-4, A-2-4, A-1-b	0	0-25	95-100	70-90	40-90	20-70	20-30	4-10	
	28	Unweathered bedrock.	---	---	---	---	---	---	---	---	---	---	
Summerville--	0-7	Sandy loam----	SC-SM, SC, CL, CL-ML	A-2-4, A-4	0	0-10	95-100	90-100	55-85	25-55	20-30	4-10	
	7-15	Fine sandy loam, sandy loam.	SC-SM, SC, CL, CL-ML	A-2-4, A-4, A-2-6	0	0-15	95-100	90-100	55-85	25-55	20-35	4-15	
	15	Unweathered bedrock.	---	---	---	---	---	---	---	---	---	---	
Ma*. Made land													
McB, McD----- Mancelona	0-6	Loamy sand----	SM, SP-SM	A-2, A-1-b	0	0-15	90-100	75-95	35-80	10-35	---	NP	
	6-20	Loamy sand----	SM, SP-SM	A-2, A-1-b, A-3	0	0-15	80-100	75-95	35-75	10-30	---	NP	
	20-24	Sandy loam, loam, gravelly clay loam.	SC-SM, SC, CL, CL-ML	A-2, A-4, A-6	0	0-15	85-100	55-95	35-90	50-70	20-35	4-15	
	24-60	Very gravelly sand, gravelly sand, sand.	GP, SP, GW, SW	A-1, A-2, A-3	0	0-15	40-90	30-85	20-60	0-15	---	NP	
Mh*. Marsh													
MLB----- Melita	0-10	Sand-----	SM, SP-SM	A-2, A-3, A-1	0	0-5	95-100	90-100	45-75	5-15	---	NP	
	10-44	Sand, loamy sand, loamy fine sand.	SM, SP-SM	A-2, A-3, A-1	0	0-5	95-100	90-100	45-80	5-35	---	NP	
	44-54	Loam, clay loam.	ML, CL-ML	A-4, A-6, A-7	0	0-5	95-100	90-100	75-95	55-90	25-45	4-15	
	54-60	Loam-----	CL-ML, CL	A-4, A-6	0	0-5	95-100	90-100	75-95	55-75	25-40	4-15	

See footnote at end of table.

TABLE 13.--ENGINEERING INDEX PROPERTIES--Continued

Soil name and map symbol	Depth	USDA texture	Classification		Frag- ments inches	Frag- ments inches	Percentage passing				Liquid limit	Plas- ticity index	
			Unified	AASHTO			> 10	3-10	4	10	40		
	In				Pct	Pct						Pct	
MnB, MnD----- Menominee	0-10	Loamy sand----	SM	A-2-4, A-4, A-1-b	0	0-10	95-100	95-100	50-75	15-30	---	---	NP
	10-30	Sand, loamy sand.	SM, SP-SM	A-2-4, A-3, A-1-b	0	0-10	85-100	75-100	35-75	0-30	---	---	NP
	30-42	Clay loam, loam.	CL, CL-ML	A-4, A-6	0	0-10	85-95	85-95	80-95	60-75	25-40	5-20	
	42-60	Loam, clay loam.	CL, CL-ML, SC, SC-SM	A-4, A-6, A-1, A-2	0	0-10	95-100	75-95	65-95	45-80	25-40	5-20	
MuB, MuD, MuE- Munising	0-6	Sandy loam----	SM, SC-SM	A-4, A-2-4	0	0-8	95-100	85-100	50-85	25-45	<25	NP-6	
	6-16	Sandy loam, fine sandy loam.	SM, SC-SM	A-4, A-2-4	0	0-8	95-100	85-100	50-85	25-50	<25	NP-6	
	16-46	Sandy loam, loamy sand.	SM, SC, SP-SM, SC-SM	A-2, A-4, A-1-b	0	0-8	95-100	85-100	40-80	10-40	<30	NP-10	
	46-60	Sandy loam----	SM, SC-SM	A-4, A-2-4	0	0-8	95-100	85-100	50-70	25-40	<25	NP-7	
Nh----- Nahma	0-5	Muck-----	PT	A-8	0	0	---	---	---	---	---	---	
	5-25	Sandy loam, loam.	SM, ML, CL, SC	A-4, A-2, A-1-b	0	0-20	95-100	75-100	45-95	20-75	20-30	2-9	
	25-29	Sandy loam, loam.	SM, ML, CL, SC	A-4, A-2, A-1-b	0	0-20	90-100	75-100	45-95	20-75	20-30	2-9	
	29	Unweathered bedrock.	---	---	---	---	---	---	---	---	---	---	
NsA, NsB----- Nester	0-8	Silt loam----	ML, CL, CL-ML	A-4, A-6	0	0-5	90-100	75-100	70-100	55-90	15-35	2-15	
	8-9	Silt loam----	ML, CL	A-4, A-6, A-2-4	0	0-5	90-100	75-100	70-100	50-90	<35	NP-15	
	9-20	Clay loam, silty clay loam.	CL, CH	A-7	0	0-5	90-100	75-100	75-100	55-95	40-55	20-30	
	20-60	Clay loam, silty clay loam.	CL	A-7	0	0-5	90-100	75-100	70-100	50-95	40-50	15-25	
OnA, OnB, OnC, OnD----- Onaway	0-4	Fine sandy loam.	SC-SM, SC	A-2, A-4, A-6, A-1	0-5	0-10	90-100	75-95	45-80	20-50	20-30	4-11	
	4-10	Sandy loam, loam.	SC-SM, SC, CL-ML	A-2, A-4, A-6, A-1	0-5	0-10	90-100	75-95	45-90	20-70	20-30	4-11	
	10-22	Loam, clay loam.	CL, SC	A-4, A-6, A-7	0-5	0-20	85-100	75-95	65-95	45-90	25-45	7-22	
	22-60	Loam-----	ML, SC, CL, SM	A-4, A-6, A-2, A-1	0-5	0-20	70-95	70-95	65-95	45-75	15-35	NP-15	

See footnote at end of table.

TABLE 13.--ENGINEERING INDEX PROPERTIES--Continued

Soil name and map symbol	Depth	USDA texture	Classification		Frag- ments	Frag- ments	Percentage passing				Liquid limit	Plas- ticity index
			Unified	AASHTO	> 10 inches	3-10 inches	4	10	40	200		
	In				Pct	Pct						Pct
OoE*:												
Onota-----	0-7	Sandy loam----	SM, SC-SM	A-2, A-4	0	0-10	95-100	90-100	55-70	25-40	<25	2-7
	7-24	Sandy loam----	SM, SC-SM, SC	A-2, A-4, A-6	0	0-10	95-100	90-100	55-70	25-40	<25	2-11
	24-28	Loamy sand, sandy loam.	SM, SC, SC-SM, SP-SM	A-2, A-4, A-1	0	0-10	95-100	90-100	45-75	10-40	<25	NP-10
	28-31	Weathered bedrock.		---	---	---	---	---	---	---	---	---
	31	Unweathered bedrock.		---	---	---	---	---	---	---	---	---
Chippeny----	0-20	Muck-----	PT	---	---	---	---	---	---	---	---	---
	20-28	Silty clay loam, loamy sand, sandy loam.	SC-SM, CL-ML, GM-GC	A-2, A-4, A-6, A-1-a	0-5	0-30	90-100	75-100	35-100	10-90	<50	NP-30
	28	Unweathered bedrock.		---	---	---	---	---	---	---	---	---
OrB*, OrD*:												
Onota-----	0-7	Sandy loam----	SM, SC-SM	A-2, A-4	0	0-10	95-100	90-100	55-70	25-40	<25	2-7
	7-24	Sandy loam----	SM, SC-SM, SC	A-2, A-4, A-6	0	0-10	95-100	90-100	55-70	25-40	<25	2-11
	24-28	Loamy sand, sandy loam.	SM, SC, SC-SM, SP-SM	A-2, A-4, A-1	0	0-10	95-100	90-100	45-75	10-40	<25	NP-10
	28-31	Weathered bedrock.		---	---	---	---	---	---	---	---	---
	31	Unweathered bedrock.		---	---	---	---	---	---	---	---	---
Deerton-----	0-8	Loamy sand----	SM, SP-SM	A-1-b, A-2-4	0	0-5	95-100	90-100	45-70	10-30	---	NP
	8-24	Sand, loamy sand.	SM, SP, SP-SM	A-1-b, A-2-4, A-3	0	0-10	85-100	80-95	40-75	4-30	---	NP
	24-38	Weathered bedrock.		---	---	---	---	---	---	---	---	---
	38	Unweathered bedrock.		---	---	---	---	---	---	---	---	---
OtB-----	0-9	Loamy sand----	SM, SP-SM, SC-SM	A-2, A-1-b	0	0	95-100	90-100	45-75	10-30	<20	NP-5
Otisco	9-29	Loamy sand, sand.	SM, SP-SM, SC-SM	A-2, A-3, A-1-b	0	0	95-100	90-100	45-75	5-30	<20	NP-5
	29-41	Stratified loamy sand to very fine sandy loam.	SM, SP-SM, CL, SC	A-2, A-4, A-3, A-6	0	0	95-100	90-100	45-90	10-65	<30	NP-15
	41-60	Sand, loamy sand.	SM, SP-SM, SC-SM	A-2, A-3, A-1-b	0	0	95-100	90-100	45-75	5-30	<20	NP-5
Pc-----	0-4	Silt loam----	CL	A-4, A-6	0	0	100	100	85-100	60-90	25-40	7-15
Pickford	4-18	Silty clay----	CH, CL	A-7	0	0	100	100	90-100	75-95	45-70	20-40
	18-60	Silty clay----	CH, CL	A-7	0	0	100	100	90-100	75-95	45-70	25-40
PfA-----	0-8	Silt loam----	CL	A-4, A-6	0	0-2	95-100	95-100	80-100	70-90	25-40	7-15
Algonquin	8-14	Silty clay----	CL, CH	A-7	0	0-2	95-100	95-100	85-100	80-95	45-65	20-40
	14-60	Silty clay----	CL, CH	A-7	0	0-2	95-100	95-100	85-100	80-95	45-65	20-40

See footnote at end of table.

TABLE 13.--ENGINEERING INDEX PROPERTIES--Continued

Soil name and map symbol	Depth	USDA texture	Classification		Frag- ments	Frag- ments	Percentage passing			Liquid limit	Plas- ticity index	
			Unified	AASHTO	> 10 inches	3-10 inches	4	10	40			
	In				Pct	Pct				Pct		
PkA*:												
Algonquin----	0-8	Silt loam----	CL	A-4, A-6	0	0-2	95-100	95-100	80-100	70-90	25-40	7-15
	8-14	Silty clay----	CL, CH	A-7	0	0-2	95-100	95-100	85-100	80-95	45-65	20-40
	14-60	Silty clay----	CL, CH	A-7	0	0-2	95-100	95-100	85-100	80-95	45-65	20-40
Pickford-----	0-4	Silt loam----	CL	A-4, A-6	0	0	100	100	85-100	60-90	25-40	7-15
	4-18	Silty clay----	CH, CL	A-7	0	0	100	100	90-100	75-95	45-70	20-40
	18-60	Silty clay----	CH, CL	A-7	0	0	100	100	90-100	75-95	45-70	25-40
Rc-----	0-4	Mucky sand----	SM, SP-SM	A-2, A-3, A-1	0	0	95-100	85-100	40-75	5-15	<20	NP-4
Roscommon	4-60	Sand-----	SP, SP-SM, SM	A-1, A-2, A-3	0	0	95-100	85-100	40-75	0-15	<20	NP-4
RkB*:												
Roscommon----	0-4	Sand-----	SM, SP-SM	A-2, A-3, A-1	0	0	95-100	85-100	40-75	5-15	<20	NP-4
	4-60	Sand-----	SP, SP-SM, SM	A-1, A-2, A-3	0	0	95-100	85-100	40-75	0-15	<20	NP-4
Kalkaska-----	0-10	Sand-----	SM, SP-SM	A-1-b, A-2-4, A-3	0	0-5	95-100	85-100	45-70	5-15	---	NP
	10-13	Sand-----	SM, SP-SM	A-1-b, A-2-4, A-3	0	0-5	95-100	85-100	45-75	5-15	---	NP
	13-27	Sand-----	SM, SP-SM	A-1-b, A-2-4, A-3	0	0-5	95-100	85-100	45-70	5-15	---	NP
	27-60	Sand-----	SP, SP-SM, SM	A-1-b, A-2-4, A-3	0	0-5	95-100	85-100	45-70	0-15	---	NP
RoB, RoD, RsD- Rousseau	0-8	Fine sand----	SM	A-2-4	0	0	100	100	65-80	20-35	---	NP
	8-25	Fine sand----	SM	A-2-4	0	0	100	100	65-100	20-35	---	NP
	25-60	Fine sand----	SP-SM, SM	A-2-4, A-3	0	0	100	100	50-100	20-35	---	NP
RuB, RuD, RuE- Rubicon	0-4	Sand-----	SM, SP-SM, SP	A-2, A-3, A-1	0	0	95-100	75-100	35-70	0-15	---	NP
	4-27	Sand-----	SM, SP-SM, SP	A-2, A-3, A-1	0	0	95-100	75-100	35-70	0-15	---	NP
	27-60	Sand-----	SP, SP-SM, SM	A-1, A-2, A-3	0	0	95-100	75-100	30-70	0-15	---	NP
Rv-----	0-4	Silt loam----	CL-ML, CL	A-4, A-6	0	0-15	90-100	75-100	70-95	50-90	20-30	4-11
Ruse	4-11	Sandy loam, loam.	SC-SM, SC, CL, CL-ML	A-2-4, A-4, A-6	0	0-30	90-100	75-100	50-95	20-75	20-35	5-15
	11	Unweathered bedrock.	---	---	---	---	---	---	---	---	---	---
ScA-----	0-10	Sand-----	SP-SM, SM	A-3, A-2-4	0	0	100	100	50-70	5-15	---	NP
Finch	10-15	Sand-----	SP-SM, SM	A-3, A-2-4	0	0	100	100	50-70	5-15	---	NP
	15-32	Sand-----	SP-SM, SM	A-3, A-2-4	0	0	100	100	50-70	5-15	---	NP
	32-60	Sand-----	SP-SM, SM	A-3, A-2-4	0	0	100	100	50-70	5-15	---	NP

See footnote at end of table.

TABLE 13.--ENGINEERING INDEX PROPERTIES--Continued

Soil name and map symbol	Depth	USDA texture	Classification		Frag- ments	Frag- ments	Percentage passing			Liquid limit	Plas- ticity index	
			Unified	AASHTO	> 10 inches	3-10 inches	4	10	40			
	In				Pct	Pct				Pct		
ShB----- Shelldrake	0-60	Sand-----	SP, SP-SM	A-1, A-3, A-2	0	0	100	90-100	40-55	0-10	---	NP
SkB----- Skanee	0-5	Sandy loam---	SM, SC-SM,	A-2, A-4	0	0-4	95-100	85-100	45-85	25-50	<28	NP-10
			SC									
	5-14	Fine sandy loam.	SM, SC-SM,	A-2, A-4	0	0-4	95-100	85-100	55-85	30-50	<28	2-10
	14-33	Sandy loam, loamy sand, sandy clay loam.	SC, CL, SP-SC	A-2, A-4, A-6	0	0-4	95-100	85-100	40-90	10-55	25-35	7-15
	33-60	Sandy loam----	SM, SC-SM,	A-2, A-4	0	0-4	95-100	85-100	50-70	25-40	<25	3-8
			SC									
StB, StD----- Steuben	0-6	Fine sandy loam.	SM, ML	A-4, A-2-4	0	0-3	95-100	95-100	55-85	25-55	---	NP
	6-19	Fine sandy loam, sandy loam.	SM, ML, CL, SC	A-4, A-2-4	0	0-3	95-100	95-100	55-85	25-55	<25	NP-10
	19-38	Loamy sand, sandy loam, sandy clay loam.	SC, CL, SC-SM, CL-ML	A-2-4, A-4, A-1-b	0	0-3	95-100	95-100	45-75	10-55	<30	5-10
	38-60	Sand, coarse sand.	SM, SP-SM	A-3, A-2-4	0	0	100	95-100	50-70	5-15	---	NP
SuA----- Summerville	0-7	Fine sandy loam.	SC-SM, SC, CL, CL-ML	A-2-4, A-4	0	0-10	95-100	90-100	55-85	25-55	20-30	4-10
	7-15	Fine sandy loam, sandy loam.	SC-SM, SC	A-2-4, A-4, A-2-6	0	0-15	95-100	90-100	55-85	25-50	20-35	4-15
	15	Unweathered bedrock.	---	---	---	---	---	---	---	---	---	---
SvA----- Sundell	0-8	Fine sandy loam.	SM, SC, SC-SM, ML	A-2, A-4	0	0-4	95-100	95-100	55-95	25-55	<20	2-9
	8-23	Sandy loam, loam, fine sandy loam.	SM, ML, CL, SC	A-2, A-4	0	0-4	95-100	95-100	65-95	25-75	<20	2-9
	23-26	Loam, fine sandy loam.	SM, ML, CL, SC	A-2, A-4	0	0-4	95-100	95-100	55-95	25-75	15-30	2-10
	26	Unweathered bedrock.	---	---	---	---	---	---	---	---	---	---
SwA----- Sundell variant	0-11	Loamy fine sand.	SM, SC-SM	A-2-4, A-4	0	0	100	100	90-95	30-50	<25	NP-7
	11-29	Loamy fine sand.	SM, SC-SM	A-2-4, A-4	0	0	100	100	90-95	30-50	<25	NP-7
	29-35	Loamy fine sand.	SM, SC-SM	A-2-4, A-4	0	0	100	100	90-95	30-50	<25	NP-7
	35	Unweathered bedrock.	---	---	---	---	---	---	---	---	---	---
Ta----- Tawas	0-4	Muck-----	PT	A-8	0	0	---	---	---	---	---	---
	4-31	Muck-----	PT	A-8	0	0	---	---	---	---	---	---
	31-60	Sand, loamy sand.	SP, SM, SP-SM	A-3, A-2-4, A-4, A-1-b	0	0	95-100	75-100	35-75	0-30	---	NP

See footnote at end of table.

TABLE 13.--ENGINEERING INDEX PROPERTIES--Continued

Soil name and map symbol	Depth	USDA texture	Classification		Frag- ments	Frag- ments	Percentage passing				Liquid limit	Plas- ticity index
			Unified	AASHTO	> 10 inches	3-10 inches	4	10	40	200		
	In				Pct	Pct						Pct
TrA, TrB, TrC, TrD----- Trenary	0-6	Fine sandy loam.	SM, SC-SM	A-2, A-4	0	0-8	95-100	85-100	55-85	30-50	<25	NP-7
	6-17	Fine sandy loam.	SM	A-4, A-2-4	0	0-8	95-100	85-100	55-85	25-60	<25	NP-7
	17-26	Sandy loam----	SM, SC-SM	A-2, A-4, SP-SM	0	0-8	95-100	85-100	50-70	25-40	<25	NP-7
	26-37	Loam, sandy clay loam.	SC, CL	A-2, A-4, A-6	0	0-8	95-100	85-100	55-95	25-75	25-40	7-15
	37-80	Sandy loam, loam.	SM, ML, CL, SC	A-2, A-4	0	0-8	95-100	85-100	55-90	25-75	<30	NP-10
WaA----- Wainola	0-9	Fine sand----	SM	A-2-4	0	0	100	90-100	60-80	15-35	---	NP
	9-24	Fine sand, loamy fine sand.	SM	A-2-4, A-4	0	0	100	90-100	50-80	15-50	---	NP
	24-60	Fine sand, loamy fine sand.	SM	A-2-4, A-4	0	0	100	90-100	50-80	15-50	---	NP
WlB, WlD----- Wallace	0-7	Sand-----	SP, SP-SM	A-2-4, A-3, A-1-b	0	0	95-100	95-100	45-70	0-10	---	NP
	7-30	Sand-----	SM, SP-SM	A-2-4, A-3, A-1-b	0	0	95-100	90-100	45-95	5-15	---	NP
	30-60	Sand-----	SP, SP-SM	A-2-4, A-3, A-1-b	0	0	95-100	90-100	45-95	0-15	---	NP
Wm----- Wheatley	0-5	Mucky loamy sand.	SM, SP-SM, SC-SM	A-2-4, A-1-b, A-3	0	0-5	90-100	75-100	35-75	10-30	<25	NP-7
	5-34	Sand, loamy sand.	SM, SP-SM	A-2-4, A-1-b, A-3	0	0-5	80-95	75-90	35-75	5-30	<20	NP-4
	34-60	Gravelly sand, gravelly loamy sand, very gravelly sand.	GW, SW, GP, SP	A-1-b, A-1-a, A-2-4, A-3	0-5	5-15	20-80	20-60	20-60	0-20	<20	NP-4
	0-7	Sand-----	SP-SM, SM	A-1, A-2, A-3	0	0-2	95-100	75-100	35-85	5-30	---	NP
	7-24	Loamy sand, sand.	SP-SM, SM	A-2, A-1-b	0	0-2	95-100	75-100	35-75	10-30	<20	NP-4
YaB, YaD----- Yalmer	24-36	Loamy sand, sandy loam.	SM, SC-SM, SP-SM	A-2, A-1-b, A-4	0	0-6	95-100	75-100	40-75	10-50	<25	NP-7
	36-41	Sandy loam, loam.	SM, SC, ML, CL	A-2, A-4, A-1-b	0	0-6	95-100	75-100	45-85	20-65	<25	NP-8
	41-60	Sandy loam----	SM, SC, SC-SM	A-2, A-4, A-1-b	0	0-6	95-100	75-100	45-85	20-50	<25	NP-8

* See description of the map unit for composition and behavior characteristics of the map unit.

TABLE 14.--PHYSICAL AND CHEMICAL PROPERTIES OF THE SOILS

(The symbol < means less than; > means more than. Entries under "Erosion factors--T" apply to the entire profile. Entries under "Wind erodibility group" and "Organic matter" apply only to the surface layer. Absence of an entry indicates that data were not available or were not estimated)

Soil name and map symbol	Depth	Clay	Moist bulk density	Permeability	Available water capacity	Soil reaction	Shrink-swell potential	Erosion		Wind erodi- bility	Organic matter
								In	Pct		
Ad*-----	0-60	---	---	---	---	---	---	---	---	---	---
Alluvial land											
A1C-----	0-7	5-15	1.25-1.55	2.0-20	0.05-0.14	6.6-7.8	Low-----	0.17	2	8	2-4
Alpena	7-60	0-10	1.25-1.65	>20	0.02-0.04	7.9-8.4	Low-----	0.10			
AuB-----	0-8	0-8	1.30-1.55	6.0-20	0.07-0.10	3.6-6.0	Low-----	0.10	5	1	2-4
Au Gres	8-27	1-15	1.50-1.70	6.0-20	0.06-0.09	4.5-6.0	Low-----	0.10			
	27-60	0-8	1.50-1.70	6.0-20	0.05-0.07	5.6-6.5	Low-----	0.10			
AvA-----	0-10	0-15	1.25-1.45	6.0-20	0.09-0.12	5.6-6.0	Low-----	0.15	4	2	1-3
Battlefield	10-20	0-15	1.40-1.60	6.0-20	0.06-0.12	5.6-6.0	Low-----	0.10			
	20-60	0-5	1.50-1.65	>20	0.02-0.04	6.6-8.4	Low-----	0.10			
B1B, B1D, B1E----	0-10	0-5	1.35-1.60	6.0-20	0.07-0.09	5.1-6.0	Low-----	0.15	5	1	.5-2
Blue Lake	10-25	5-12	1.30-1.60	6.0-20	0.06-0.11	5.1-6.0	Low-----	0.17			
	25-32	8-15	1.30-1.60	2.0-6.0	0.06-0.12	5.1-6.0	Low-----	0.17			
	32-60	0-5	1.45-1.70	6.0-20	0.05-0.07	5.6-7.3	Low-----	0.17			
BoB, BoD-----	0-5	5-15	1.30-1.65	0.6-2.0	0.16-0.20	5.1-6.5	Low-----	0.24	5	3	1-3
Bohemian	5-17	10-18	1.30-1.65	0.6-2.0	0.15-0.20	5.1-6.5	Low-----	0.43			
	17-28	18-25	1.30-1.70	0.2-0.6	0.15-0.20	5.6-6.5	Low-----	0.43			
	28-60	10-35	1.35-1.65	0.2-0.6	0.17-0.20	6.6-8.4	Low-----	0.37			
Bp*. Borrow pits											
BrA-----	0-7	15-27	1.40-1.70	0.6-2.0	0.20-0.22	6.1-7.3	Low-----	0.37	4	6	1-3
Bowers	7-11	15-27	1.45-1.60	0.2-0.6	0.12-0.17	6.1-7.3	Moderate---	0.37			
	11-18	35-40	1.45-1.60	0.06-0.2	0.18-0.20	6.1-7.3	Moderate---	0.43			
	18-60	30-40	1.50-1.65	0.06-0.6	0.18-0.22	7.4-7.8	Moderate---	0.43			
Bs-----	0-8	2-15	0.90-1.30	2.0-6.0	0.12-0.17	5.6-7.3	Low-----	0.17	5	2	10-15
Brevort	8-30	2-15	1.40-1.55	2.0-20	0.05-0.11	5.6-7.3	Low-----	0.17			
	30-60	10-27	1.45-1.80	0.2-0.6	0.14-0.22	7.4-8.4	Moderate---	0.43			
BtA-----	0-8	10-20	1.35-1.50	0.6-2.0	0.16-0.22	5.6-7.3	Low-----	0.24	5	3	1-3
Brimley	8-17	10-20	1.45-1.70	0.6-2.0	0.16-0.24	5.6-7.3	Low-----	0.32			
	17-22	18-35	1.45-1.70	0.2-0.6	0.17-0.22	5.6-7.3	Low-----	0.43			
	22-60	10-27	1.45-1.70	0.2-0.6	0.10-0.22	7.4-8.4	Low-----	0.43			
Bu-----	0-5	5-10	1.10-1.35	2.0-6.0	0.22-0.24	6.1-7.3	Low-----	0.24	5	3	10-15
Bruce variant	5-13	5-10	1.45-1.60	0.6-2.0	0.14-0.19	6.6-7.3	Low-----	0.43			
	13-60	2-10	1.55-1.70	0.6-2.0	0.06-0.20	6.6-8.4	Low-----	0.37			
BwC-----	0-5	2-10	1.30-1.60	2.0-6.0	0.14-0.17	4.5-6.0	Low-----	0.24	2	3	10-20
Burt	5-17	0-8	1.30-1.60	6.0-20	0.04-0.08	4.5-6.0	Low-----	0.15			
	17	---	---	0.2-2.0	---	---	---	---			
Cb*: Carbondale-----	0-4	---	0.30-0.40	0.6-6.0	0.45-0.55	5.1-7.8	-----	5	5		50-70
	4-32	---	0.13-0.23	0.2-6.0	0.35-0.45	5.1-7.8	-----				
	32-60	---	0.10-0.17	0.6-6.0	0.45-0.55	5.6-7.8	-----				

See footnote at end of table.

TABLE 14.--PHYSICAL AND CHEMICAL PROPERTIES OF THE SOILS--Continued

Soil name and map symbol	Depth	Clay	Moist bulk density	Permeability	Available water capacity	Soil reaction	Shrink-swell potential	Erosion factors		Wind erodibility	Organic matter group
								K	T		
											Pct
Cb*:											
Lupton-----	0-46	---	0.10-0.35	0.2-6.0	0.35-0.45	5.6-7.8	-----	-----	5	2	70-90
	46-60	---	0.10-0.35	0.2-6.0	0.35-0.45	5.6-7.8	-----	-----			
Rifle-----	0-4	---	0.20-0.35	>6.0	0.55-0.65	5.6-7.8	-----	-----	5	7	70-90
	4-60	---	0.08-0.20	0.6-6.0	0.45-0.55	5.6-7.8	-----	-----			
Ch-----	0-11	---	0.28-0.45	0.2-6.0	0.35-0.45	6.1-7.8	-----	-----	5	2	60-85
Cathro	11-23	---	0.15-0.30	0.2-6.0	0.35-0.45	6.1-7.8	-----	0.24			
	23-60	10-30	1.50-1.70	0.2-2.0	0.11-0.22	6.6-8.4	Low-----	0.32			
Ck*:											
Cathro-----	0-11	---	0.28-0.45	0.2-6.0	0.35-0.45	6.1-7.8	-----	-----	5	2	60-85
	11-23	---	0.15-0.30	0.2-6.0	0.35-0.45	6.1-7.8	-----	0.24			
	23-60	10-30	1.50-1.70	0.2-2.0	0.11-0.22	6.6-8.4	Low-----	0.32			
Tacoosh-----	0-8	---	0.10-0.30	0.2-6.0	0.35-0.45	5.6-7.8	-----	-----	5	2	>75
	8-40	---	0.10-0.20	0.6-6.0	0.45-0.55	5.6-7.8	-----	-----			
	40-60	5-35	1.40-2.00	0.2-2.0	0.12-0.20	6.1-8.4	Low-----	0.32			
CLA-----	0-7	8-15	1.30-1.65	2.0-6.0	0.12-0.18	6.1-6.5	Low-----	0.24	5	3	2-3
Charlevoix	7-19	10-18	1.35-1.65	2.0-6.0	0.08-0.20	6.1-7.8	Low-----	0.24			
	19-29	15-35	1.40-1.70	0.6-6.0	0.12-0.18	6.1-7.8	Low-----	0.32			
	29-60	10-18	1.55-1.70	0.6-6.0	0.06-0.12	7.4-8.4	Low-----	0.32			
CmA, CmB, CmD-----	0-13	2-15	1.10-1.60	2.0-6.0	0.13-0.17	6.1-7.8	Low-----	0.24	4	3	1-3
Chatham	13-23	5-18	1.25-1.70	2.0-6.0	0.10-0.14	6.1-7.8	Low-----	0.24			
	23-60	0-10	1.50-1.70	2.0-6.0	0.02-0.05	6.5-8.4	Low-----	0.10			
Cn-----	0-20	---	0.15-0.30	0.2-0.6	0.35-0.45	6.1-7.8	-----	-----	4	2	55-75
Chippeny	20-28	5-45	1.45-1.75	0.06-2.0	0.04-0.19	6.6-8.4	Low-----	-----			
	28	---	---	0.06-0.6	---	---	-----	-----			
CrA-----	0-5	0-10	1.30-1.55	6.0-20	0.06-0.09	4.5-6.0	Low-----	0.10	5	1	.5-2
Croswell	5-28	0-10	1.40-1.60	6.0-20	0.06-0.10	4.5-6.0	Low-----	0.10			
	28-60	0-10	1.50-1.65	6.0-20	0.05-0.07	5.6-6.5	Low-----	0.10			
Da-----	0-8	---	0.15-0.30	>6.0	0.55-0.65	3.6-4.4	-----	-----	4	7	65-85
Dawson	8-38	---	0.15-0.40	0.2-6.0	0.35-0.45	3.6-5.0	-----	-----			
	38-40	10-15	1.55-1.75	0.6-2.0	0.18-0.20	3.6-5.5	Low-----	0.24			
	40-60	0-10	1.55-1.75	6.0-20	0.03-0.10	3.6-5.5	Low-----	0.10			
Dd*:											
Dawson-----	0-8	---	0.15-0.30	>6.0	0.55-0.65	3.6-4.4	-----	-----	4	7	65-85
	8-38	---	0.15-0.40	0.2-6.0	0.35-0.45	3.6-5.0	-----	-----			
	38-40	10-15	1.55-1.75	0.6-2.0	0.18-0.20	3.6-5.0	Low-----	0.24			
	40-60	0-10	1.55-1.75	6.0-20	0.03-0.10	3.6-5.5	Low-----	0.10			
Greenwood-----	0-10	---	0.30-0.40	>6.0	0.55-0.65	3.6-4.4	-----	-----	5	7	55-75
	10-60	---	0.10-0.25	0.6-6.0	0.45-0.55	3.6-5.0	-----	-----			
DeB, DeD-----	0-8	2-10	1.30-1.60	6.0-20	0.06-0.10	3.6-6.0	Low-----	0.15	4	1	.5-2
Deerton	8-24	3-12	1.30-1.60	2.0-20	0.05-0.10	3.6-6.0	Low-----	0.15			
	24-38	---	---	0.2-0.6	---	---	-----	-----			
	38	---	---	0.2-2.0	---	---	-----	-----			

See footnote at end of table.

TABLE 14.--PHYSICAL AND CHEMICAL PROPERTIES OF THE SOILS--Continued

Soil name and map symbol	Depth	Clay	Moist bulk density	Permeability	Available water capacity	Soil reaction	Shrink-swell potential	Erosion factors		Wind erodibility	Organic matter group
								K	T		
											Pct
DlB*											
Deerton-----	0-8	2-10	1.30-1.60	6.0-20	0.06-0.10	3.6-6.0	Low-----	0.15	4	1	.5-2
	8-24	3-12	1.30-1.60	2.0-20	0.05-0.10	3.6-6.0	Low-----	0.15			
	24-38	---	---	0.2-0.6	---	---	-----				
	38	---	---	0.2-2.0	---	---	-----				
Burt-----	0-5	2-10	1.30-1.60	6.0-20	0.12-0.14	4.5-6.0	Low-----	0.17	2	2	10-20
	5-17	0-8	1.30-1.60	6.0-20	0.04-0.08	4.5-6.5	Low-----	0.15			
	17	---	---	0.2-2.0	---	---	-----				
Dm-----	0-3	0-10	1.35-1.40	6.0-20	0.04-0.06	5.6-7.8	Low-----	0.17	5	1	4-10
Deford	3-60	0-12	1.40-1.60	6.0-20	0.05-0.07	5.6-8.4	Low-----	0.17			
DuB-----	0-6	5-12	1.25-1.50	6.0-20	0.10-0.12	5.1-6.5	Low-----	0.17	4	2	1-2
Duel	6-21	2-10	1.25-1.50	6.0-20	0.10-0.12	5.1-6.5	Low-----	0.15			
	21-28	5-12	1.25-1.60	6.0-20	0.06-0.11	5.1-6.5	Low-----	0.15			
	28-31	2-25	1.50-1.65	0.6-20	0.04-0.15	7.4-8.4	Low-----	0.15			
	31	---	---	0.06-0.6	---	---	-----				
EaB-----	0-7	0-8	1.30-1.60	6.0-20	0.06-0.09	5.6-6.5	Low-----	0.10	4	1	2-3
Springlake	7-36	3-10	1.35-1.60	6.0-20	0.05-0.11	5.6-6.0	Low-----	0.15			
	36-60	0-5	1.50-1.65	>20	0.02-0.04	7.4-8.4	Low-----	0.10			
EcB, EcD-----	0-5	0-5	1.00-1.30	6.0-20	0.06-0.12	5.1-6.0	Low-----	0.17	5	2	2-5
Adams	5-26	0-5	1.10-1.45	6.0-20	0.03-0.10	5.1-6.0	Low-----	0.17			
	26-60	0-5	1.20-1.50	>20	0.03-0.04	5.1-6.5	Low-----	0.17			
EdB-----	0-4	0-10	1.40-1.60	6.0-20	0.07-0.09	5.6-7.3	Low-----	0.15	5	1	1-2
Eastport	4-19	0-10	1.40-1.60	6.0-20	0.06-0.08	5.6-7.3	Low-----	0.15			
	19-60	0-4	1.40-1.55	6.0-20	0.03-0.06	7.4-8.4	Low-----	0.15			
EaB*:											
Eastport-----	0-4	0-10	1.40-1.60	6.0-20	0.07-0.09	5.6-7.3	Low-----	0.15	5	1	1-2
	4-19	0-10	1.40-1.60	6.0-20	0.06-0.08	5.1-7.3	Low-----	0.15			
	19-60	0-4	1.40-1.55	6.0-20	0.03-0.06	7.4-8.4	Low-----	0.15			
Roscommon-----	0-4	0-10	0.90-1.60	6.0-20	0.07-0.18	5.1-7.3	Low-----	0.15	5	1	4-15
	4-60	0-10	1.45-1.70	6.0-20	0.05-0.09	5.1-8.4	Low-----	0.17			
EmA, EmB, EmC-----	0-10	3-12	1.30-1.65	2.0-6.0	0.12-0.15	5.6-6.5	Low-----	0.24	5	3	1-3
Emmet	10-26	3-12	1.40-1.70	2.0-6.0	0.11-0.14	6.1-7.3	Low-----	0.24			
	26-33	10-18	1.50-1.75	0.6-2.0	0.11-0.18	6.6-7.8	Low-----	0.32			
	33-60	5-15	1.50-1.75	0.6-6.0	0.08-0.14	7.4-8.4	Low-----	0.28			
EnA-----	0-6	10-18	1.30-1.50	0.6-2.0	0.13-0.15	6.1-7.8	Low-----	0.17	2	3	2-3
Ensign	6-17	10-25	1.40-1.70	0.6-2.0	0.13-0.17	6.1-8.4	Low-----	0.24			
	17	---	---	0.06-0.6	---	---	-----				
Eg*:											
Ensley-----	0-4	5-18	1.30-1.60	2.0-6.0	0.10-0.15	6.1-7.3	Low-----	0.24	5	3	3-6
	4-30	10-25	1.30-1.70	0.6-2.0	0.11-0.18	6.6-7.3	Low-----	0.24			
	30-60	8-18	1.45-1.70	0.6-6.0	0.10-0.14	7.4-8.4	Low-----	0.20			
Angelica-----	0-6	10-20	1.15-1.60	0.6-2.0	0.18-0.22	6.1-7.3	Low-----	0.28	5	5	2-12
	6-14	18-35	1.50-1.80	0.6-2.0	0.10-0.18	6.1-7.3	Low-----	0.28			
	14-17	18-35	1.50-1.80	0.2-0.6	0.10-0.20	6.1-7.3	Moderate---	0.28			
	17-60	5-20	1.45-1.95	0.2-0.6	0.10-0.20	7.4-8.4	Low-----	0.24			

See footnote at end of table.

TABLE 14.--PHYSICAL AND CHEMICAL PROPERTIES OF THE SOILS--Continued

Soil name and map symbol	Depth	Clay	Moist bulk density	Permeability	Available water capacity	Soil reaction	Shrink-swell potential	Erosion factors		Wind erodibility	Organic matter group
								K	T		
FaA, FaB----- Fairport	0-9	12-20	1.35-1.50	0.6-2.0	0.20-0.24	5.6-7.8	Low-----	0.28	4	5	1-3
	9-25	18-35	1.45-1.70	0.2-0.6	0.12-0.20	5.6-7.8	Moderate-----	0.28			
	25-28	5-35	1.45-1.70	0.2-2.0	0.10-0.20	7.4-8.4	Low-----	0.28			
	28	---	---	0.06-0.6	---	---	-----				
GcB----- Gilchrist	0-5	0-5	1.35-1.65	6.0-20	0.04-0.06	5.1-6.0	Low-----	0.15	5	1	.5-2
	5-30	2-8	1.30-1.70	6.0-20	0.04-0.10	6.1-7.8	Low-----	0.15			
	30-60	2-10	1.55-1.70	0.6-2.0	0.08-0.12	7.9-8.4	Low-----	0.28			
GrB, GrD----- Grayling	0-3	0-10	1.30-1.65	6.0-20	0.07-0.09	3.6-5.5	Low-----	0.15	5	1	1-6
	3-15	0-10	1.30-1.65	6.0-20	0.06-0.08	3.6-5.5	Low-----	0.15			
	15-60	0-10	1.45-1.65	6.0-20	0.04-0.06	4.5-6.5	Low-----	0.15			
Gw----- Greenwood	0-10	---	0.30-0.40	>6.0	0.55-0.65	3.6-4.4	-----	-----	5	7	55-75
	10-60	---	0.10-0.25	0.6-6.0	0.45-0.55	3.6-5.0	-----	-----			
IoB----- Iosco	0-12	0-10	1.25-1.40	6.0-20	0.07-0.09	4.5-6.5	Low-----	0.15	5	1	1-4
	12-29	0-15	1.35-1.60	6.0-20	0.06-0.11	5.1-6.5	Low-----	0.17			
	29-60	15-35	1.50-1.70	0.2-0.6	0.17-0.20	6.1-8.4	Moderate-----	0.37			
KaB, KaD, KaE----- Kalkaska	0-10	0-10	1.25-1.45	6.0-20	0.05-0.09	3.6-6.0	Low-----	0.15	5	1	1-4
	10-13	0-15	1.35-1.45	6.0-20	0.06-0.08	3.6-6.0	Low-----	0.15			
	13-27	0-10	1.35-1.45	6.0-20	0.06-0.08	4.5-6.0	Low-----	0.15			
	27-60	0-10	1.35-1.50	6.0-20	0.04-0.06	4.5-6.5	Low-----	0.15			
KdB, KdD----- Karlin	0-4	12-15	1.35-1.60	2.0-6.0	0.15-0.17	3.6-6.0	Low-----	0.20	4	3	1-2
	4-17	2-15	1.35-1.60	2.0-6.0	0.08-0.16	3.6-6.0	Low-----	0.15			
	17-22	0-15	1.40-1.65	6.0-20	0.03-0.08	4.5-6.0	Low-----	0.15			
	22-60	0-10	1.40-1.70	6.0-20	0.03-0.04	5.6-6.5	Low-----	0.10			
KgC----- Kawbawgam	0-6	5-15	1.30-1.60	0.6-2.0	0.08-0.14	4.5-5.5	Low-----	0.24	4	3	2-4
	6-24	5-15	1.30-1.70	0.6-6.0	0.08-0.14	5.1-6.0	Low-----	0.24			
	24	---	---	0.2-2.0	---	---	-----	---			
KlA----- Kawkaulin	0-10	8-27	1.45-1.60	0.2-0.6	0.20-0.24	6.1-7.3	Low-----	0.37	3	5	2-4
	10-21	35-40	1.45-1.60	0.06-0.2	0.10-0.20	6.1-7.8	Moderate-----	0.32			
	21-60	30-40	1.50-1.60	0.06-0.2	0.13-0.20	7.9-8.4	Moderate-----	0.32			
KnB, KnD----- Keweenaw	0-8	2-15	1.35-1.60	2.0-6.0	0.09-0.12	4.5-6.0	Low-----	0.15	5	2	1-2
	8-29	2-15	1.45-1.80	2.0-6.0	0.08-0.11	4.5-6.0	Low-----	0.15			
	29-32	0-15	1.50-1.80	2.0-6.0	0.05-0.11	4.5-6.0	Low-----	0.15			
	32-39	0-15	1.50-1.80	0.6-6.0	0.06-0.14	4.5-6.0	Low-----	0.20			
	39-60	2-15	1.50-1.70	2.0-6.0	0.04-0.10	5.1-6.0	Low-----	0.15			
Kr----- Kinross	0-4	0-10	1.10-1.20	6.0-20	0.12-0.17	3.6-5.0	Low-----	0.15	5	1	10-15
	4-18	0-10	1.40-1.70	6.0-20	0.04-0.09	3.6-5.5	Low-----	0.15			
	18-60	0-10	1.40-1.70	6.0-20	0.04-0.06	4.5-5.5	Low-----	0.15			
KsB, KsD----- Kiva	0-5	10-18	1.20-1.60	0.6-2.0	0.10-0.15	6.1-7.8	Low-----	0.20	3	3	.5-2
	5-22	10-18	1.30-1.60	0.6-2.0	0.09-0.19	6.1-7.8	Low-----	0.24			
	22-60	0-5	1.50-1.70	>20	0.02-0.04	7.9-8.4	Low-----	0.05			
Lb*. Lake beaches											
Lm*. Limestone rock land											

See footnote at end of table.

TABLE 14.--PHYSICAL AND CHEMICAL PROPERTIES OF THE SOILS--Continued

Soil name and map symbol	Depth	Clay	Moist bulk density	Permeability	Available water capacity	Soil reaction	Shrink-swell potential	Erosion factors		Wind erodibility	Organic matter group
								K	T		
											Pct
LoA, LoB-----	0-10	5-15	1.10-1.60	2.0-6.0	0.10-0.16	6.1-7.3	Low-----	0.20	4	3	1-3
Longrie	10-24	10-18	1.35-1.65	0.6-2.0	0.09-0.19	6.1-7.8	Low-----	0.28			
	24-28	10-18	1.35-1.65	0.6-2.0	0.09-0.18	6.6-7.8	Low-----	0.37			
	28	---	---	0.06-0.6	---	---	-----	---			
LsD*:											
Longrie-----	0-10	5-15	1.10-1.60	2.0-6.0	0.10-0.16	6.1-7.3	Low-----	0.20	4	3	1-3
	10-24	10-18	1.35-1.65	0.6-2.0	0.09-0.19	6.1-7.8	Low-----	0.28			
	24-28	10-18	1.35-1.65	0.6-2.0	0.09-0.18	6.6-7.8	Low-----	0.37			
	28	---	---	0.06-0.6	---	---	-----	---			
Summerville----	0-7	10-18	1.30-1.60	2.0-6.0	0.08-0.18	6.1-7.8	Low-----	0.24	2	3	1-2
	7-15	10-25	1.35-1.65	0.6-2.0	0.10-0.16	6.1-7.8	Low-----	0.24			
	15	---	---	0.06-0.6	---	---	-----	---			
Ma*. Made land											
McB, McD-----	0-6	0-10	1.35-1.65	2.0-6.0	0.08-0.12	5.6-7.3	Low-----	0.17	4	2	.5-3
Mancelona	6-20	2-15	1.30-1.65	6.0-20	0.06-0.12	5.6-7.3	Low-----	0.17			
	20-24	10-30	1.30-1.65	2.0-6.0	0.06-0.16	6.1-7.3	Low-----	0.17			
	24-60	0-10	1.45-1.65	>20	0.02-0.04	7.4-8.4	Low-----	0.10			
Mh*. Marsh											
MlB-----	0-10	0-10	1.35-1.60	6.0-20	0.06-0.08	5.1-7.3	Low-----	0.15	5	1	3-4
Melita	10-44	0-15	1.35-1.60	6.0-20	0.04-0.10	5.1-7.3	Low-----	0.17			
	44-54	18-35	1.45-1.70	0.2-0.6	0.14-0.19	6.1-7.3	Low-----	0.32			
	54-60	18-35	1.45-1.70	0.2-0.6	0.13-0.18	7.4-8.4	Low-----	0.32			
MnB, MnD-----	0-10	2-15	1.35-1.65	2.0-6.0	0.10-0.12	5.1-6.5	Low-----	0.17	5	2	.5-3
Menominee	10-30	5-15	1.35-1.65	6.0-20	0.05-0.09	5.1-7.3	Low-----	0.10			
	30-42	18-35	1.45-1.70	0.2-0.6	0.14-0.18	6.1-7.3	Moderate---	0.28			
	42-60	12-35	1.45-1.75	0.2-0.6	0.13-0.18	6.1-8.4	Moderate---	0.32			
MuB, MuD, MuE----	0-6	5-12	1.30-1.65	2.0-6.0	0.10-0.18	4.5-6.0	Low-----	0.20	4	3	1-3
Munising	6-16	5-12	1.35-1.65	0.6-2.0	0.09-0.17	4.5-6.0	Low-----	0.20			
	16-46	5-18	1.80-2.10	<0.06	0.02-0.04	4.5-6.0	Low-----	0.20			
	46-60	5-15	1.55-1.75	0.6-2.0	0.02-0.04	5.6-6.5	Low-----	0.24			
Nh-----	0-5	---	0.30-0.40	0.2-6.0	0.35-0.45	6.1-7.8	-----	---	4	2	40-60
Nahma	5-25	8-15	1.30-1.60	0.6-2.0	0.12-0.20	6.1-7.8	Low-----	0.24			
	25-29	12-18	1.40-1.70	0.6-2.0	0.10-0.19	6.6-8.4	Low-----	0.24			
	29	---	---	0.06-0.6	---	---	-----	---			
NsA, NsB-----	0-8	7-27	1.25-1.60	0.6-2.0	0.20-0.24	6.1-7.3	Low-----	0.37	3	5	1-3
Nester	8-9	5-25	1.25-1.60	0.6-2.0	0.15-0.22	6.1-7.3	Low-----	0.28			
	9-20	35-45	1.40-1.60	0.06-0.2	0.08-0.17	6.1-7.3	Moderate---	0.28			
	20-60	30-40	1.40-1.65	0.06-0.2	0.10-0.17	7.9-8.4	Moderate---	0.32			
OnA, OnB, OnC, OnD-----											
Onaway	0-4	10-20	1.30-1.55	2.0-6.0	0.08-0.16	6.1-7.3	Low-----	0.24	4	3	1-3
	4-10	10-20	1.40-1.70	2.0-6.0	0.12-0.17	5.1-7.3	Low-----	0.24			
	10-22	18-35	1.40-1.70	0.2-0.6	0.12-0.19	6.1-7.8	Low-----	0.32			
	22-60	5-25	1.45-1.75	0.2-0.6	0.10-0.20	7.4-8.4	Low-----	0.32			

See footnote at end of table.

TABLE 14.--PHYSICAL AND CHEMICAL PROPERTIES OF THE SOILS--Continued

Soil name and map symbol	Depth	Clay	Moist bulk density	Permeability	Available water capacity	Soil reaction	Shrink-swell potential	Erosion factors		Wind erodibility	Organic matter group	Pct
								K	T			
OoE*:												
Onota-----	0-7	5-15	1.30-1.65	2.0-6.0	0.12-0.15	5.1-6.5	Low-----	0.24	4	3	1-3	
	7-24	8-18	1.30-1.65	0.6-6.0	0.11-0.14	5.1-6.5	Low-----	0.24				
	24-28	8-18	1.35-1.70	0.6-6.0	0.07-0.13	5.1-6.5	Low-----	0.24				
	28-31	---	---	0.2-0.6	---	---	-----	-----				
	31	---	---	0.2-2.0	---	---	-----	-----				
Chippeny-----	0-20	---	0.15-0.30	0.2-0.6	0.35-0.45	6.1-7.8	-----	-----	4	2	55-75	
	20-28	5-45	1.45-1.75	0.06-2.0	0.04-0.19	6.6-8.4	Low-----	-----				
	28	---	---	0.06-0.6	---	---	-----	-----				
OrB*, OrD*:												
Onota-----	0-7	5-15	1.30-1.65	2.0-6.0	0.12-0.15	5.1-6.5	Low-----	0.24	4	3	1-3	
	7-24	8-18	1.30-1.65	0.6-6.0	0.11-0.14	5.1-6.5	Low-----	0.24				
	24-28	8-18	1.35-1.70	0.6-6.0	0.07-0.13	5.1-6.5	Low-----	0.24				
	28-31	---	---	0.2-0.6	---	---	-----	-----				
	31	---	---	0.2-2.0	---	---	-----	-----				
Deerton-----	0-8	2-10	1.30-1.60	6.0-20	0.10-0.15	3.6-6.0	Low-----	0.17	4	2	.5-2	
	8-24	3-12	1.30-1.60	2.0-20	0.05-0.10	3.6-6.0	Low-----	0.15				
	24-38	---	---	0.2-0.6	---	---	-----	-----				
	38	---	---	0.2-2.0	---	---	-----	-----				
OtB-----	0-9	2-12	1.25-1.40	6.0-20	0.10-0.12	5.1-6.5	Low-----	0.17	5	2	2-4	
Otisco	9-29	2-12	1.25-1.40	2.0-20	0.06-0.11	5.1-6.5	Low-----	0.17				
	29-41	5-22	1.35-1.45	2.0-6.0	0.05-0.17	5.6-7.8	Low-----	0.17				
	41-60	0-12	1.25-1.50	2.0-20	0.05-0.10	5.6-7.8	Low-----	0.17				
Pc-----	0-4	15-27	1.10-1.35	0.6-2.0	0.20-0.24	6.5-7.8	Low-----	0.43	3	5	3-15	
Pickford	4-18	40-60	1.40-1.65	<0.06	0.09-0.13	6.5-7.8	High-----	0.32				
	18-60	40-60	1.50-1.70	<0.06	0.08-0.12	7.4-8.4	High-----	0.32				
PfA-----	0-8	15-27	1.20-1.55	0.6-2.0	0.22-0.24	6.1-7.3	Low-----	0.37	3	6	2-3	
Algonquin	8-14	40-60	1.40-1.60	<0.06	0.11-0.20	6.1-8.4	High-----	0.32				
	14-60	35-60	1.40-1.70	<0.06	0.11-0.20	7.9-8.4	High-----	0.32				
PkA*:												
Algonquin-----	0-8	15-27	1.20-1.55	0.6-2.0	0.22-0.24	6.1-7.3	Low-----	0.37	3	6	2-3	
	8-14	40-60	1.40-1.60	<0.06	0.11-0.20	6.1-8.4	High-----	0.32				
	14-60	35-60	1.40-1.70	<0.06	0.11-0.20	7.9-8.4	High-----	0.32				
Pickford-----	0-4	15-27	1.10-1.35	0.6-2.0	0.20-0.24	6.5-7.8	Low-----	0.43	3	5	3-15	
	4-18	40-60	1.40-1.65	<0.06	0.09-0.13	6.5-7.8	High-----	0.32				
	18-60	40-60	1.50-1.70	<0.06	0.08-0.12	7.4-8.4	High-----	0.32				
Rc-----	0-4	0-10	0.90-1.60	6.0-20	0.07-0.18	5.1-7.3	Low-----	0.15	5	1	4-15	
Roscommon	4-60	0-10	1.45-1.70	6.0-20	0.05-0.09	5.1-8.4	Low-----	0.17				
RkB*:												
Roscommon-----	0-4	0-10	0.90-1.60	6.0-20	0.07-0.18	5.1-7.3	Low-----	0.15	5	1	4-15	
	4-60	0-10	1.45-1.70	6.0-20	0.05-0.09	5.1-8.4	Low-----	0.17				
Kalkaska-----	0-10	0-10	1.25-1.45	6.0-20	0.05-0.09	3.6-6.0	Low-----	0.15	5	1	1-4	
	10-13	0-15	1.35-1.45	6.0-20	0.06-0.08	3.6-6.0	Low-----	0.15				
	13-27	0-10	1.35-1.45	6.0-20	0.06-0.08	4.5-6.0	Low-----	0.15				
	27-60	0-10	1.35-1.50	6.0-20	0.04-0.06	5.6-6.5	Low-----	0.15				

See footnote at end of table.

TABLE 14.--PHYSICAL AND CHEMICAL PROPERTIES OF THE SOILS--Continued

Soil name and map symbol	Depth	Clay	Moist bulk density	Permeability	Available water capacity	Soil water reaction	Shrink-swell potential	Erosion factors		Wind erodibility	Organic matter group
								In	Pct		
RoB, RoD, ReD---- Rousseau	0-8	O-10	1.30-1.55	6.0-20	0.07-0.09	5.1-6.0	Low-----	0.15	5	1	1-2
	8-25	O-10	1.30-1.60	6.0-20	0.06-0.08	5.1-6.0	Low-----	0.15			
	25-60	O-10	1.50-1.65	6.0-20	0.05-0.07	5.1-6.5	Low-----	0.15			
RuB, RuD, RuE---- Rubicon	0-4	O-5	1.25-1.45	6.0-20	0.05-0.09	4.5-6.0	Low-----	0.10	5	1	.5-2
	4-27	O-10	1.30-1.60	6.0-20	0.04-0.08	4.5-6.0	Low-----	0.10			
	27-60	O-5	1.40-1.65	6.0-20	0.04-0.06	4.5-6.5	Low-----	0.10			
Rv----- Ruse	0-4	12-20	1.20-1.50	0.6-6.0	0.17-0.24	6.5-8.4	Low-----	0.37	2	5	4-8
	4-11	10-25	1.50-1.70	0.6-6.0	0.10-0.20	6.5-8.4	Low-----	0.24			
	11	---	---	0.06-0.6	---	---	-----	---			
ScA----- Finch	0-10	O-8	1.20-1.50	6.0-20	0.07-0.09	4.5-5.5	Low-----	0.15	2	1	2-10
	10-15	5-10	1.30-1.55	6.0-20	0.06-0.08	4.5-5.5	Low-----	0.15			
	15-32	5-10	1.75-2.05	0.6-6.0	0.02-0.04	4.5-5.5	Low-----	0.15			
ShB----- Shelldrake	0-10	O-10	1.40-1.55	6.0-20	0.02-0.04	5.1-6.0	Low-----	0.15			
	0-60	O-5	1.30-1.60	>20	0.05-0.08	4.5-6.0	Low-----	0.15	5	1	.5-2
SkB----- Skaneee	0-5	5-15	1.30-1.60	2.0-6.0	0.09-0.18	4.5-6.0	Low-----	0.24	3	3	2-3
	5-14	8-18	1.40-1.70	0.6-2.0	0.11-0.17	4.5-6.0	Low-----	0.24			
	14-33	15-25	1.75-2.10	<0.06	0.04-0.06	4.5-6.0	Low-----	0.24			
StB, StD----- Steuben	0-5	5-15	1.30-1.60	2.0-6.0	0.09-0.18	4.5-6.0	Low-----	0.24	3	3	1-3
	5-14	8-18	1.40-1.70	0.6-2.0	0.11-0.17	4.5-6.0	Low-----	0.24			
	14-33	15-25	1.75-2.10	<0.06	0.04-0.06	4.5-6.0	Low-----	0.24			
StB, StD----- Steuben	0-6	2-12	1.10-1.60	2.0-6.0	0.10-0.12	4.5-6.0	Low-----	0.24	3	3	1-3
	6-19	10-18	1.25-1.80	0.6-2.0	0.13-0.18	4.5-6.0	Low-----	0.24			
	19-38	12-18	1.75-2.05	0.06-0.6	0.04-0.08	4.5-6.0	Low-----	0.17			
SuA----- Summerville	0-6	2-12	1.10-1.60	2.0-6.0	0.09-0.12	6.1-7.8	Low-----	0.24	2	3	1-2
	6-19	10-25	1.35-1.65	0.6-2.0	0.10-0.16	6.1-7.8	Low-----	0.24			
	15	---	---	0.06-0.6	---	---	-----	---			
SvA----- Sundell	0-8	2-15	1.30-1.50	2.0-6.0	0.12-0.16	6.1-7.8	Low-----	0.24	4	3	5-10
	8-23	2-15	1.30-1.50	0.6-6.0	0.08-0.15	6.1-7.8	Low-----	0.24			
	23-26	8-18	1.35-1.70	0.6-2.0	0.11-0.19	6.1-8.4	Low-----	0.24			
SwA----- Sundell variant	0-26	---	---	0.06-0.6	---	---	-----	---			
	0-11	2-15	1.30-1.60	6.0-20	0.10-0.12	6.1-7.8	Low-----	0.17	4	2	1-3
	11-29	2-15	1.30-1.60	6.0-20	0.07-0.11	6.1-7.8	Low-----	0.17			
Ta----- Tawas	29-35	2-15	1.30-1.60	6.0-20	0.07-0.11	6.1-7.8	Low-----	0.17			
	35	---	---	0.06-0.6	---	---	-----	---			
TrA, TrB, TrC, TrD----- Trenary	0-4	---	0.30-0.55	0.2-6.0	0.35-0.45	5.6-7.8	-----	-----	4	2	40-60
	4-31	---	0.30-0.55	0.2-6.0	0.24-0.45	5.6-7.8	-----	-----			
	31-60	0-10	1.40-1.65	6.0-20	0.03-0.10	5.1-7.8	Low-----	0.15			
WaA----- Wainola											
	0-9	0-10	1.35-1.50	6.0-20	0.07-0.09	5.1-6.5	Low-----	0.15	5	1	2-4
	9-24	2-12	1.35-1.50	6.0-20	0.06-0.11	5.1-6.5	Low-----	0.15			
	24-60	0-10	1.25-1.50	6.0-20	0.05-0.07	5.1-7.3	Low-----	0.15			

See footnote at end of table.

TABLE 14.--PHYSICAL AND CHEMICAL PROPERTIES OF THE SOILS--Continued

Soil name and map symbol	Depth	Clay	Moist bulk density	Permeability	Available water capacity	Soil reaction	Shrink-swell potential	Erosion factors			Wind erodi- bility group	Organic matter Pct
								In	Pct	g/cc	In/hr	
W1B, W1D Wallace	0-7	0-8	1.35-1.45	6.0-20	0.07-0.09	4.5-5.5	Low-----	0.15	1	1		.5-2
	7-30	2-10	1.75-2.05	0.6-6.0	0.01-0.04	4.5-5.5	Low-----	0.15				
	30-60	0-8	1.45-1.60	6.0-20	0.04-0.05	5.6-6.5	Low-----	0.15				
Wm Wheatley	0-5	0-15	0.90-1.30	2.0-6.0	0.12-0.15	6.1-7.3	Low-----	0.17	3	2		10-15
	5-34	2-10	1.45-1.70	6.0-20	0.06-0.08	6.1-7.3	Low-----	0.15				
	34-60	0-10	1.55-1.70	>20	0.02-0.04	7.4-8.4	Low-----	0.10				
YaB, YaD Yalmer	0-7	0-5	1.35-1.55	6.0-20	0.07-0.09	5.1-6.0	Low-----	0.15	4	1		2-3
	7-24	0-10	1.30-1.60	6.0-20	0.06-0.11	5.1-6.0	Low-----	0.17				
	24-36	0-12	1.80-2.05	<0.06	0.02-0.04	5.1-6.0	Low-----	0.24				
	36-41	5-15	1.40-1.65	0.6-2.0	0.02-0.04	5.1-6.0	Low-----	0.24				
	41-60	5-15	1.40-1.65	0.6-2.0	0.02-0.04	5.1-6.0	Low-----	0.24				

* See description of the map unit for composition and behavior characteristics of the map unit.

TABLE 15.--SOIL AND WATER FEATURES

("Flooding" and "water table" and terms such as "frequent," "apparent," and "perched" are explained in the text. means less than; > means more than. Absence of an entry indicates that the feature is not a concern or that estimated)

Soil name and map symbol	Hydro-logic group	Flooding			High water table			Bedrock			R. action
		Frequency	Duration	Months	Kind	Months	Depth	Hardness	frost	Un- frost	
Ad*											
Alluvial land											
A1C											
Alpena	A	None	---	---	---	---	---	---	---	---	
AuB	B	None	---	---	>6.0	---	---	>60	---	Low	Low
Au Gres											
AvA	A/D	None	---	---	0.5-1.5	Apparent	Nov-May	>60	---	Moderate	Low
Battlefield											
B1B, B1D, B1E	A	None	---	---	0.5-1.5	Apparent	Nov-May	>60	---	Moderate	High
Blue Lake											
BoB, BoD	B	None	---	---	0.5-1.5	Apparent	Nov-May	>60	---	Moderate	High
Bohemian											
Bp*											
Borrow pits											
BrA	C	None	---	---	1.0-2.0	Apparent	Nov-Apr	>60	---	High	High
Bowers											
Bs	B/D	None	---	---	+	1-1.0	Apparent	Nov-May	>60	---	Moderate
Brevort											
BtA	C	None	---	---	1.0-2.0	Apparent	Nov-May	>60	---	High	High
Brimley											
Bu	B/D	None	---	---	+	1-1.0	Apparent	Nov-May	>60	---	High
Bruce variant											
BwC	D	None	---	---	+	5-1.0	Apparent	Oct-Jun	10-20	Hard	Moderate
Burt											

See footnote at end of table.

TABLE 15.--SOIL AND WATER FEATURES--Continued

Soil name and map symbol	Hydro-logic group	Flooding			High water table			Bedrock			Potential frost action	Unconsolidated action	Rise
		Frequency	Duration	Months	Depth	Kind	Months	Depth	Hardness				
Cb* : Carrabelle	A/D	None	---	---	Et	---	---	In	---	---	High	High	High
Lupton	A/D	None	---	---	+1-1.0	Apparent	Sep-Jun	>60	---	---	High	High	High
Rifle	A/D	None	---	---	+1-1.0	Apparent	Sep-Jun	>60	---	---	High	High	High
Ch.--- Cathro	A/D	None	---	---	+1-1.0	Apparent	Sep-Jun	>60	---	---	High	High	High
Ck* : Cathro	A/D	None	---	---	+1-1.0	Apparent	Sep-Jun	>60	---	---	High	High	High
Tacoosh	B/D	None	---	---	+1-1.0	Apparent	Sep-Jun	>60	---	---	High	High	High
CLA----- Charlevoix	B	None	---	---	1.0-2.0	Apparent	Nov-May	>60	---	---	High	Mod	Mod
CnA, CmB, CmD----- Chatham	B	None	---	---	>6.0	---	---	>60	---	---	Moderate	Low	Low
Cn----- Chippeny	D	None	---	---	+1-1.0	Apparent	Sep-Jun	20-51	Hard	---	High	High	High
CrA----- Croswell	A	None	---	---	2.0-3.5	Apparent	Nov-May	>60	---	---	Low	Low	Low
Da----- Dawson	A/D	None	---	---	+1-1.0	Apparent	Sep-Jun	>60	---	---	High	High	High
Dd* : Dawson	A/D	None	---	---	+1-1.0	Apparent	Sep-Jun	>60	---	---	High	High	High
Greenwood	A/D	None	---	---	+1-1.0	Apparent	Sep-Jun	>60	---	---	High	High	High
DeB, DeD----- Deereton	A	None	---	---	>6.0	---	---	20-40	Hard	---	Low	Low	Low
DLB* : Dearton	A	None	---	---	>6.0	---	---	20-40	Hard	---	Low	Low	Low
Burt	D	None	---	---	+5-1.0	Apparent	Oct-Jun	10-20	Hard	---	Moderate	High	High

See footnote at end of table.

TABLE 15.--SOIL AND WATER FEATURES--Continued

Soil name and map symbol	Hydro-logic group	Flooding			High water table			Bedrock			Potential frost action	Uncertainties	Ri
		Frequency	Duration	Months	Kind	Depth	Months	Depth	Hardness	In			
Dm-Deford	A/D	None	---	---	Fr	---	---	---	---	---	Moderate	Low	
DuB-Duel	A	None	---	---	+1-1.0	Apparent	Oct-May	>60	---	---	Moderate	Low	
EaB-Springlake	A	None	---	---	>6.0	---	---	20-40	Hard	Low	Low	Low	
EcB, EcD-Adams	A	None	---	---	>6.0	---	---	>60	---	---	Low	Low	
EdB-Eastport	A	None	---	---	>6.0	---	---	>60	---	---	Low	Low	
EeB*: Eastport	A	None	---	---	>6.0	---	---	>60	---	---	Low	Low	
Roscommon	A/D	None	---	---	+1-1.0	Apparent	Sep-Jun	>60	---	---	Moderate	Hi	
EmA, EmB, EmC-Emmet	B	None	---	---	>6.0	---	---	>60	---	---	Moderate	Low	
EnA-Ensign	D	None	---	---	0.5-1.0	Apparent	Oct-May	10-20	Hard	High	High	Hi	
Es*: Ensley	B/D	None	---	---	+1-1.0	Apparent	Oct-Jun	>60	---	---	High	Hi	
Angelica	B/D	None	---	---	+1-1.0	Apparent	Oct-Jun	>60	---	---	High	Hi	
FaA, FaB-Fairport	C	None	---	---	>6.0	---	---	20-40	Hard	---	Moderate	Mo	
GcB-Gilchrist	A	None	---	---	2.5-5.0	Apparent	Nov-May	>60	---	Low	Low	Low	
GrB, GrD-Grayling	A	None	---	---	>6.0	---	---	>60	---	---	Low	Low	
Gw-Greenwood	A/D	None	---	---	+1-1.0	Apparent	Sep-Jun	>60	---	---	High	Hi	

See footnote at end of table.

TABLE 15.--SOIL AND WATER FEATURES--Continued

Soil name and map symbol	Hydro-logic group	Flooding			High water table			Bedrock			Potential frost action	Resistance
		Frequency	Duration	Months	Depth	Kind	Months	Depth	Hardness	In		
IoB-- Tosco	B	None---	---	---	Et	---	---	---	---	---	Moderate	High
KaB, KaD, KaE-- Kalkaska	A	None---	---	---	10-5-1.5	Apparent	Nov-Jun	>60	---	---	Low	Low
KdB, RdB-- Karin	A	None---	---	---	>6.0	---	---	>60	---	---	Low	Low
KgC-- Kawbagam	C	None---	---	---	>6.0	---	---	>60	---	---	Low	Low
KLA-- Kawkawlin	C	None---	---	---	0.5-1.0	Apparent	Nov-May	20-40	Hard	High	High	High
KnB, KnD-- Keweenaw	A	None---	---	---	1-0-2.0	Apparent	Oct-May	>60	---	High	High	High
Kr-- Kinross	A/D	None---	---	---	>6.0	---	---	>60	---	Low	Low	Low
KsB, KsD-- Kiva	A	None---	---	---	+1-1.0	Apparent	Oct-May	>60	---	Moderate	Moderate	High
Lb*. Lake beaches					>6.0	---	---	>60	---	Low	Low	Low
Lm*. Limestone rock land												
LoA, LoB-- Longrie	B	None---	---	---	>6.0	---	---	20-40	Hard	Moderate	Low	Low
LsD*. Longrie	B	None---	---	---	>6.0	---	---	20-40	Hard	Moderate	Low	Low
Summerville-- Made Land	D	None---	---	---	>6.0	---	---	10-20	Hard	Moderate	Low	Low
Ma*. Made Land												

See footnote at end of table.

TABLE 15.--SOIL AND WATER FEATURES--Continued

Soil name and map symbol	Hydro-logic group	Flooding			High water table			Bedrock			Potential frost action	Resistance
		Frequency	Duration	Months	Depth	Kind	Months	Depth	Hardness	In		
McB, McD Mancelona	A None	---	---	---	---	Ft	---	---	---	---	Low	Low
Mh* Marsh	A None	---	---	---	>6.0	---	---	>60	---	---	Low	Low
MLB Melita	A None	---	---	---	>6.0	---	---	>60	---	---	Low	Low
MnB, MnD Menominee	A None	---	---	---	>6.0	---	---	>60	---	---	Low	Low
MuB, MuD Munising	B None	---	---	---	1.0-2.0	Perched	Nov-May	>60	---	---	Moderate	Low
MuE Munising	B None	---	---	---	>6.0	---	---	>60	---	---	Moderate	Low
Nh Nahma	B/D None	---	---	---	+1-1.0	Apparent	Nov-Jun	20-40	Hard	High	High	High
NsA Nester	C None	---	---	---	2.5-5.0	Perched	Mar-May	>60	---	---	Moderate	High
NsB Nester	C None	---	---	---	>6.0	---	---	>60	---	---	Moderate	High
OnA Onaway	B None	---	---	---	2.5-6.0	Apparent	Nov-May	>60	---	---	Moderate	Low
OnB, OnC, OnD Onaway	B None	---	---	---	>6.0	---	---	>60	---	---	Moderate	Low
OoE* Onota	B None	---	---	---	>6.0	---	---	20-40	Hard	High	Moderate	Low
Chippewy	D None	---	---	---	+1-1.0	Apparent	Sep-Jun	20-51	Hard	High	High	High
OrB*, OrD* Onota	B None	---	---	---	>6.0	---	---	20-40	Hard	High	Moderate	Low
Deerton	A None	---	---	---	>6.0	---	---	20-40	Hard	Low	Low	Low

See footnote at end of table.

TABLE 15.--SOIL AND WATER FEATURES--Continued

Soil name and map symbol	Hydro-logic group	Flooding			High water table			Bedrock			R
		Frequency	Duration	Months	Depth	Kind	Months	Depth	Hardness	frost action	
OtB--Otisco	A	None	---	---	Et	---	---	In	---	---	
Pc--Pickford	D	None	---	---	0.5-1.5	Apparent	Nov-May	>60	---	Moderate	Low
PfA--Algonquin	D	None	---	---	+1-1.0	Perched	Nov-Jun	>60	---	High	Hi
PKA* : Algonquin	D	None	---	---	0.5-1.5	Perched	Oct-May	>60	---	High	Hi
Pickford--	D	None	---	---	+1-1.0	Perched	Nov-Jun	>60	---	High	Hi
Rc--Roscommon	A/D	None	---	---	+1-1.0	Apparent	Sep-Jun	>60	---	Moderate	Hi
RkB* : Roscommon	A/D	None	---	---	+1-1.0	Apparent	Sep-Jun	>60	---	Moderate	Hi
Kalkaska--	A	None	---	---	>6.0	---	---	>60	---	Low	Low
RoB, RoD, RsD--Rousseau	A	None	---	---	>6.0	---	---	>60	---	Low	Low
RuB, RuD, RuE--Rubicon	A	None	---	---	>6.0	---	---	>60	---	Low	Low
Rv--Ruse	D	None	---	---	+1-1.0	Apparent	Oct-May	10-20	Hard	High	Hi
ScA--Finch	C	None	---	---	0.5-1.5	Apparent	Dec-Jun	>60	---	Moderate	Hi
ShB--Sheldrake	A	None	---	---	>6.0	---	---	>60	---	Low	Low
SkB--Skaneee	C	None	---	---	0.5-1.5	Perched	Nov-May	>60	---	High	Mo
StB, StD--Steuben	B	None	---	---	1.0-2.5	Perched	Nov-May	>60	---	Moderate	Low

See footnote at end of table.

TABLE 15.--SOIL AND WATER FEATURES--Continued

Soil name and map symbol	Hydro-logic group	Flooding Frequency	Duration	Months	Depth	Kind	Months	Depth	Hardness	Bedrock	Potential frost action	R _f
SuA--Summerville	D	None-----	---	---	---	Fr	---	---	In	---	Moderate	Low
SvA--Sundell	B	None-----	---	---	---	0.5-1.5	Apparent	Nov-May	20-40	Hard	High	Moist
SwA--Sundell variant	A	None-----	---	---	---	1.0-2.0	Apparent	Nov-May	20-40	Hard	Moderate	Low
Ta--Tawas	A/D	None-----	---	---	---	+1-1.0	Apparent	Sep-Jun	>60	---	High	High
TrA--Trenary	B	None-----	---	---	---	2.5-6.0	Apparent	Nov-Apr	>60	---	Moderate	Low
TrB, TrC, TrD--Trenary	B	None-----	---	---	---	>6.0	---	---	>60	---	Moderate	Low
WaA--Wainola	B	None-----	---	---	---	0.5-1.5	Apparent	Nov-May	>60	---	Moderate	Low
W1B, W1D--Wallace	B	None-----	---	---	---	>6.0	---	---	>60	---	Low	Low
Wm--Wheatley	A/D	None-----	---	---	---	+1-1.0	Apparent	Oct-May	>60	---	Moderate	High
YaB, YaD--Yalmer	B	None-----	---	---	---	1.5-2.0	Perched	Mar-May	>60	---	Low	Low

* See description of the map unit for composition and behavior characteristics of the map unit.

TABLE 16.--CLASSIFICATION OF THE SOILS

(An asterisk in the first column indicates that the soil is a taxadjunct to the series. See text for a description of those characteristics of the soil that are outside the range of the series. Because of changes in soil taxonomy, the classification of soils in this supplement may differ from that in the original survey)

Soil name	Family or higher taxonomic class
Adams-----	Sandy, mixed, frigid Typic Haplorthods
Algonquin-----	Fine, mixed, nonacid, frigid Aeric Epiaquepts
Alluvial land-----	Fluvaquents
Alpena-----	Sandy-skeletal, mixed Udorthentic Haplborolls
Angelica-----	Fine-loamy, mixed, nonacid, frigid Aeric Endoaquepts
Au Gres-----	Sandy, mixed, frigid Typic Endoaquods
Battlefield-----	Sandy, mixed, frigid Typic Endoaquods
*Blue Lake-----	Sandy, mixed, frigid Alfic Haplorthods
Bohemian-----	Fine-loamy, mixed, frigid Alfic Haplorthods
*Bowers-----	Fine, mixed Glossaqueic Eutroboralfs
*Brevort-----	Sandy over loamy, mixed, nonacid, frigid Mollic Endoaquents
Brimley-----	Fine-loamy, mixed, frigid Argic Endoaquods
Bruce Variant-----	Coarse-loamy, mixed, nonacid, frigid Aeric Endoaquepts
*Burt-----	Siliceous, frigid Lithic Psammaquents
Carbondale-----	Euic Hemic Borosaprists
Cathro-----	Loamy, mixed, euic Terric Borosaprists
Charlevoix-----	Coarse-loamy, mixed, frigid Argic Endoaquods
Chatham-----	Coarse-loamy, mixed, frigid Typic Haplorthods
Chippeny-----	Euic Lithic Borosaprists
Croswell-----	Sandy, mixed, frigid Oxyaqueic Haplorthods
Dawson-----	Sandy or sandy-skeletal, mixed, dysic Terric Borosaprists
Deerton-----	Sandy, mixed, frigid Entic Haplorthods
Deford-----	Mixed, frigid Typic Psammaquents
Duel-----	Sandy, mixed, frigid Typic Haplorthoda
Eastport-----	Mixed, frigid Spodic Udipsammants
Emmet-----	Coarse-loamy, mixed Typic Eutroboralfs
Ensign-----	Loamy, mixed, frigid Lithic Eutrochrepts
Ensley-----	Coarse-loamy, mixed, nonacid, frigid Aeric Endoaquepts
Fairport-----	Fine-loamy, mixed Typic Eutroboralfs
Finch-----	Sandy, mixed, frigid ortstein Typic Duraquods
Gilchrist-----	Sandy, mixed, frigid Oxyaqueic Haplorthods
Grayling-----	Mixed, frigid Typic Udipsammants
Greenwood-----	Dysic Typic Borchemists
Iosco-----	Sandy over loamy, mixed, frigid Typic Endoaquods
Kalkaska-----	Sandy, mixed, frigid Typic Haplorthods
Karlin-----	Sandy, mixed, frigid Entic Haplorthods
Kawbawgam-----	Coarse-loamy, mixed, frigid Typic Endoaquods
Kawkawlin-----	Fine, mixed Glossaqueic Eutroboralfs
Keweenaw-----	Sandy, mixed, frigid Alfic Haplorthods
Kinross-----	Sandy, mixed, frigid Typic Endoaquods
Kiva-----	Sandy, mixed, frigid Entic Haplorthods
Longrie-----	Coarse-loamy, mixed, frigid Entic Haplorthods
Lupton-----	Euic Typic Borosaprists
Mancelona-----	Sandy, mixed, frigid Alfic Haplorthods
Melita-----	Sandy, mixed, frigid Alfic Haplorthods
Menominee-----	Sandy over loamy, mixed, frigid Alfic Haplorthods
Munising-----	Coarse-loamy, mixed, frigid Oxyaqueic Fragiorthods
Nahma-----	Coarse-loamy, mixed, nonacid, frigid Histic Humaquepts
Nester-----	Fine, mixed Glossic Eutroboralfs
Onaway-----	Fine-loamy, mixed Typic Eutroboralfs
Onota-----	Coarse-loamy, mixed, frigid Typic Haplorthods
Otisco-----	Sandy, mixed, frigid Argic Endoaquods
*Pickford-----	Fine, mixed, nonacid, frigid Aeric Epiaquepts
Rifle-----	Euic Typic Borchemists
Roscommon-----	Mixed, frigid Mollic Psammaquents
Rousseau-----	Sandy, mixed, frigid Entic Haplorthods
Rubicon-----	Sandy, mixed, frigid Entic Haplorthods

TABLE 16.--CLASSIFICATION OF THE SOILS--Continued

Soil name	Family or higher taxonomic class
Ruse-----	Loamy, mixed, nonacid, frigid Lithic Endoaquepts
Shelldrake-----	Frigid, uncoated Typic Quartzipsammments
Skanee-----	Coarse-loamy, mixed, frigid Alfic Fragiaquods
Springlake-----	Sandy, mixed, frigid Typic Haplorthods
Steuben-----	Coarse-loamy, mixed, frigid Alfic Fragiorthods
Summerville-----	Loamy, mixed, frigid Lithic Eutrochrepts
Sundell-----	Coarse-loamy, mixed Aquic Haploborolls
Sundell Variant-----	Sandy, mixed, frigid Typic Endoaquods
Tacoosh-----	Loamy, mixed, euic Terric Borohemists
Tawas-----	Sandy or sandy-skeletal, mixed, euic Terric Borosaprists
Trenary-----	Coarse-loamy, mixed, frigid Alfic Haplorthods
*Wainola-----	Sandy, mixed, frigid Typic Endoaquods
Wallace-----	Sandy, mixed, frigid, ortstein Typic Durorthods
Wheatley-----	Mixed, frigid Mollie Psammaquents
Yalmer-----	Sandy, mixed, frigid Alfic Fragiorthods

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